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Taken by Katsuhiko Tokunaga

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publish under the same name.

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if we have omitted this then please let us
know and we will correct in the next issue.

Editor's letter

As we enter the New Year it looks like it should be another excellent twelve months for flight simulation. Interest in the genre is rising again and despite the odd hysterical article from the gutter press, we seem to be regaining our rightful place as the only sensible thing to do with a PC. Ubisoft have done well with IL-2, NovaLogic report that Comanche 4 is a success and the introduction of FS2002 (and Train Simulator) seems to have given many of the publishers of add-ons a new lease of life and most of them seem to be thriving. Conversely, one ropery old crook, famed for publishing freeware without permission (and other assorted crimes) seems to be getting closer to Skid Row, which has to be good news for the buying public.

One interesting thing we learned from one of the country's leading PR companies was that so-called mainstream games magazines are happy to review Train Simulator add-on software, but they deem that flight simulators are 'not interesting enough'. This may explain why our readership is bucking the trend set by many of the PC games titles, and the number of people reading PC Pilot is still rising with each new issue. It looks like there's no future in publishing, unless your name is PC Pilot! For this we must pass on our hearty thanks, to you, our readers.

Putting our own trumpet down for just a moment, we were interested to see an item about PS1 (the highly accurate 747 simulator) that was passed to us by one of our contributors. The question was posed: "Has anyone ever said that they 'trained' on PS1 at an airline interview? What did the airline say? Is it the kind of thing you should mention?" The following reply came back from Sander van Bergen, who is currently studying economics at the University of Amsterdam whilst he waits to get older.

"This summer I applied to a Dutch agency which does its training at BAe Systems in Jerez de la Frontera (Europilot program) and the BA academy at Western Michigan University (BA program). This agency still offers a job guarantee upon completing the training and type rating. Flying the 737-300/700 at EasyJet as a First Officer is the most common position you will get after 16 months of training. They have a 100% success rate of offering a fully paid job as a First Officer within a couple of months after gaining the integrated ATPL licence. The selection consisted of lots of tests, assessments and interviews. The basis for the interview was a personal statement I had to write. In this statement I had to state my

interests and motivation to become an airline pilot and even what would make me a good one. Quite hard, as you can imagine. Anyway, in this statement I said that I was currently studying 744 systems by means of a PC flight simulation program. After the test came the interview. The guy conducting it was a retired 747-200 captain from Martinair. He said that he had read my personal statement and was amazed that I knew some basic concepts like Crew Resource Management. After a while in the interview he asked about my interest in the 744 and the studying I had done. He asked me if I knew what a CAT3 approach was - of course I did (thanks to PS1). He then revealed that he was currently a senior KLM 744 simulator instructor and he was already very impressed. He then asked "How much do you know about flying the 744?" I said: "Ask me any question and I will try to answer."

"OK," he said, "how do you start the engines?" I then summed up the KLM 744 AOM procedures with all call outs and limits. He almost fell out of his chair! Especially because I was just a 17 year old kid with no flight experience. We discussed NATS, non-precision approaches and VNAV and he was truly amazed. After a while he said that we had surpassed the goal of the interview which was to find out how much I wanted to become an airline pilot. According to him no further investigation was necessary regarding determination. My application was quite successful; I was accepted in all aspects, except for my age and maturity. Flying a 737 at just 19 was a little too young, so I can come back this summer to do some additional tests (without charge this time) and then begin training."

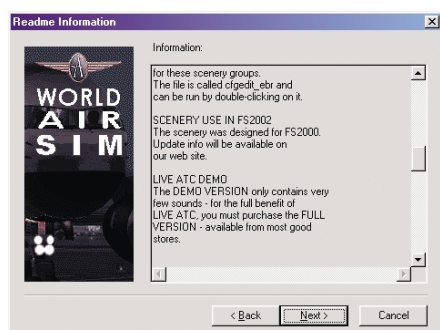
Quite a heart-warming story, we think you'll agree. You probably wouldn't get a commission in the SAS if you said that you'd spent the last three years playing Operation Flashpoint!

See you in the next issue.

Dermot Stapleton
Managing Editor

PRESS FREEDOM?

We certainly stirred up a hornet's nest when we mentioned the problems we'd experienced installing World Air Simulation's supposedly 'optimised' software into FS2002. We had so many letters and e-mails we can only print a selection:



FROM: S. Millington

Recently I purchased FS2002 and was pleased with the product. However like most simmers I was soon looking to improve and build on a solid Microsoft product. I carefully chose to do this with what I believed to be Microsoft endorsed products, all made by World Air Simulation and clearly stating Microsoft FS2002 on the top right of the box. I carefully loaded them and followed the directions to install to the correct locale. I got an error message saying that this third party software may not be compatible with FS2002 and that LIVEATC.DLL file was the culprit! I turned for help to the shop, but they could only pass me on to the Microsoft help desk, who said that they could not advise me as they do not support third party software.

FROM: S. Barker

I've just bought Heathrow Live for FS2002 and can't install it properly. This is despite pointing it at the right directory (program files/fs2002), erasing all my FS2000 files to avoid conflict with FS2002, uninstalling and re-installing both Heathrow Live & FS2002 programs at least twice.

FROM: G. Cox

...then you have the Gatwick Scenery, I don't expect to pay another £30 for a Shareware wall to be placed across the runway. Yet another visit to their website, yes the wall has

gone now but what a circus. Don't these people try their software before they market it? Well, the article you wrote in the magazine is 100% true, and their threat of legal action? What a joke. Let them go ahead. I say you can't lose. Trading Standards comes to mind where World Air Sim is concerned.

FROM: P. Steele

...here was a company that should be avoided at all costs...there is a distinct possibility that it will sink without trace.

FROM: T. Horne

It appears that the company has no interest in its customers and is out to make a quick buck. That's all right, but first make sure that the software does the job...I have never in all the years I have been purchasing software, been confronted by such a host of problems.

AND FINALLY.... From Andy Payne of The Producers, winner of the latest IET Lifetime Achievement Award:

Call me controversial, but I am happy to say that in 1996 Peter Tishma worked with my company, The Producers, and we had a brilliantly concentrated relationship. Having signed a NDA which for a number of years prevented me spreading the word about how good Peter was. I am pleased to say that the shackles are now off and I am released to tell the world the good news. Peter really did make a difference in the very short time we had together. He conducted a total review of the business in almost record time and set me straight on the road to success. Without Peter's help I would never have been inclined to take an active involvement in flight simulation – Hell, my confidence levels would have held me back for sure. Peter, I thank you – you made me see the light. You are the Daddy. The Papa.

Which law is this one?

Surely the icing on the cake must go to a quote from World Air Simulation in response to a letter of complaint from one of our readers:

"Should you choose to write and involve PC Pilot, we will pass the matter to our solicitors"

We suggest that WAS passes this matter straight to their solicitors and asks them to advise exactly what law prevents someone writing to the press with a complaint. As far as we know this matter isn't sub judice or covered by the Official Secrets Act.

Back in the air

FROM: Andrew Thompson

Following your favourable review of FS2002, I ordered a copy. I could not however get it to load, first it refused to update or reload Media Player 7.1 which is already on my system and then it just stopped on the DirectX screen and hung. After a very frustrating time wading through the Microsoft website, first on FS2002 then flightsims in general, I finally tried the DirectX page and found the solution. I thought I should share this with you as I can't be the only one to have the problem. The conflict is between Windows ME, DirectX8.0a and certain hidden files. The solution is to find all the OEM*.inf files and then delete every one which has a file size of 0Kb. There were 32,000 on my system which took over an hour to delete. Once this was done FS2002 loaded very smoothly and is every bit as good as you said. Keep up the good work with your excellent magazine.

We reply:

Thanks for the tip, Andrew, and hopefully this will be of use to other readers.

FROM: Don Rowley

I am considering taking part in 'fly-ins' and I have read that it is preferable to use the same callsign each time. Can you please explain the significance of the component parts of an aircraft's callsign? I can't believe it is a random collection of letters and numbers.



Chris Jarman replies:

Yes Don, aircraft registration numbers are allocated by international rules. N is for the USA, G is for the UK, D is for Germany etc.

To find out more take a look at www.landings.com, which is a huge resource of information on many aviation-related subjects.

NEWS EUROPEAN COMPUTER FLIGHT SIMULATOR SHOW 2001

Virtual Airlines

Our Virtual Airline listings have grown too large for the usual page devoted to VAs at the back of PC Pilot, but you'll find an updated list of them all on the cover CD.

RumbleFX headphones

Any UK readers wishing to buy a pair of the RumbleFX headphones that we reviewed in Issue 13 can order them online from www.rumblefx.co.uk at a price of £39.99 plus £5.50 p&p.

Next issue

Issue 16 of PC Pilot will be in the shops around 21 February 2002. If you're having trouble finding a copy in a shop near you, please try the search engine on the PC Pilot website for details of your local stockist. Failing that, get in touch, and we'll do our best to help.

Just Flight marathon man

We're pleased to hear that Mungo Amyatt-Leir, Just Flight's Managing Director, has renounced his life of debauchery and will be competing in the 2002 London marathon on the 14th April. He'll be running to raise money for the Royal British Legion's invaluable work on behalf of war veterans, and those of you who'd like to sponsor him or make a donation will be able to do so through www.pcpilot.net. Hopefully Mungo hasn't been misinformed as to the length of the marathon, as it's considerably further than his daily stroll to the wine merchants responsible for replenishing his stocks of Bollinger. We're expecting a respectable finishing time, and wish him all the very best. Rumours that he'll be running dressed as a can of Tango (his favourite 'soft' tipple) have been strongly denied.



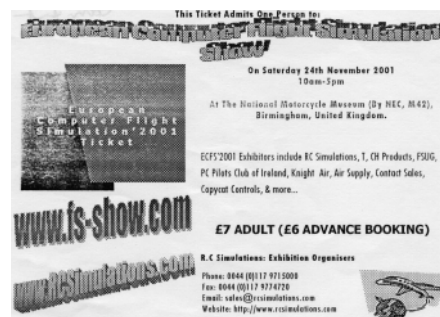
If bliss is a show containing most of what's new in the flight simulation world, then it happened at Birmingham's National Motorcycle Museum on 24 November 2001. For anyone who was smart and pre-booked a ticket, the bliss was increased by being able to walk in without even queuing. Once inside, there were two large rooms filled with exhibitors, covering software, hardware, virtual airlines, ATC, books, charts, flight simulation clubs and plenty more.

Almost everyone was using Microsoft's new FS2002 and the straw poll consensus at the show was that it's impressive; the virtual cockpit was regarded by most as the biggest improvement. This was put to good effect on the RC Simulations stand, where gyro-sensing virtual reality goggles enabled the pilot to look around both inside and outside the cockpit – fantastic, but unfortunately at a whopping price.

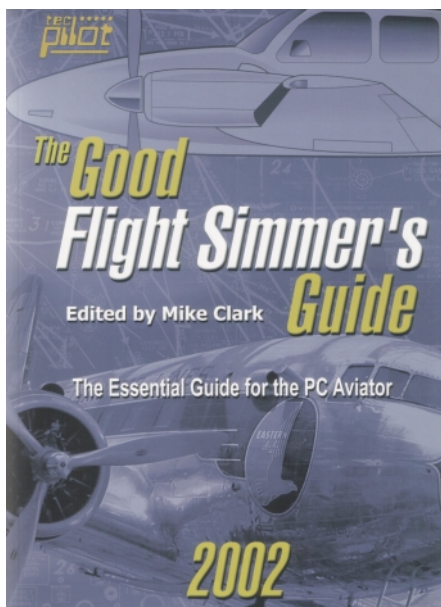
Many stands were using large screens TVs or projectors, so it was possible to see what was on display even if you weren't right next to the monitor. Microsoft was there in force

again, taking up a whole wall with a multitude of PCs showing off their products. VAT Sim was offering their free ATC service to anyone who wants to add a touch of realism to their radio work, or even those wanting to be controllers. This is real symbiosis.

There were a few grumbles from lovers of combat sims, who felt that there could have been more for them at the show, and some more younger faces would have been welcome, but at this rate the UK will soon have a show to rival those in Holland and across the Atlantic.



THE GOOD FLIGHT SIMMER'S GUIDE



Flying and computers aren't the most straightforward things to get involved with as a hobby, so it's no surprise that combining the two is likely to cause a few headaches. Mike Clark, publisher of the TecPilot website (www.tecpilot.com) knows this only too well, and his recently released Good Flight Simmer's Guide should cause many to breathe a sigh of relief.

Whether you need help with installing panels, deciding which ATC utility to invest in or the complexities of IFR flying, help is at hand.

It's fair to say that relative newcomers to flight simulation will find more here to interest them than old hands, but that's no bad thing; the intricacies of flight simulation have long cried out for some explanation in clear and readable terms. Even those of us who have been involved since the early days will find this a highly useful reference tool, and websites, manufacturers and a great deal more are all comprehensively listed. A guide to add-on scenery, aircraft and utilities – both boxed and available as downloads – should be a help in finding your way around the myriad products currently available. There's even a mention of your favourite flight simulation magazine – our website is listed on page 227!

Combat fans might feel a little left out, but they should find plenty in the reference sections to make this a worthwhile buy. Both flight simulation and computing exist in fast-changing environments, however, so hopefully future editions will include all the relevant updates. Until then, keep a copy next to your monitor. It's available from www.tecpilot.com priced at £14.99.

SAVE MONEY...AND TREES!

Although Flight Simulator 2002 has introduced a host of impressive new features into Microsoft's long-running series, one new development has disappointed many - the fact that the manual comes as a PDF file, which runs to several hundred pages. It's clear that many people prefer a printed version, but are put off by the cost and time involved in printing out the PDF. Mike Holland has come to the rescue by re-formatting the pages so that the size of the

manual is effectively halved, which is good news for all of us, and environmentally friendly as well. The zipped download files are free, but are password protected to the FS2002 manual, so that only bona fide buyers of FS2002 can access them. For more information go to Mike's Virtual Flight Services Station website at <http://flightsimmers.net/va/caphollands/fsmanual.htm>

World Flight 2001

It appears that last year's World Flight event was a great success and that, in addition to raising money for the BBC Children In Need appeal, all the participants had a hugely enjoyable time. The team of enthusiasts and real airline pilots got through 516.5 tons of virtual fuel on their 32,690-mile virtual round-the-world flight, which took nearly 125 very real hours to complete.

In spite of a few problems with the EICAS, autothrottle and autopilot - and a near miss on the runway at Zurich with their Australian counterparts - the 2001 World Flight reached its end only one and a half hours behind schedule. Let's hope that, once all the donations and pledges have been collected, they managed to raise even more than last year's impressive total.

Star Pilot's

Pilot's have announced the availability of their first set of B314 - The Clipper supplementary files. These are `real_moon.zip` and `real_stars.zip` for FS2002. Real Moon will resize the moon to its correct size and amends some issues in the waning phase. It also includes a new sun to reflect the size changes on the moon. Real Stars increases the number of stars in FS2002 from the default of 1,600 to up to 9,095. Although these files are meant to be used in the soon-to-be-released Boeing 314 - The Clipper product, they can be used on their own in FS2002 and Pilot's have generously decided to make them publicly available as freeware. Visit www.b314clipper.com for a free download!

Carenado's new Piper Tomahawk

Anyone looking for new aircraft, or perhaps wanting to add a new type to their virtual logbook, might want to take a look at a particularly interesting aircraft in our Downloads section. It's a Piper Tomahawk from Carenado, relative newcomers to the world of flight simulation who are producing some of the most accurate renditions of light aircraft we've ever seen. Our staff writer Joe Lavery did his training in a Tomahawk and was so impressed with the visual representation and accurate flight model of Carenado's version that he asked us to let you all know about this new company. Have a look for yourself at www.carenado.com - we're sure you'll be impressed.



WHY BOTHER WHEN YOU CAN HOVER?

With Comanche 4 reminding us just how much fun helicopters are, we thought it a good time to tell you about The LZ Helicopter Flight Center's fine website (www.thelz.com). It's a classy site where rotorheads can find more than enough to keep them happy - lists of quality



downloads, panels and sound files, very useful flying lessons, helicopter history, and links to other chopper sites and manufacturers. If fixed wings aren't your thing, then add this to your Favourites immediately.



Sikorsky UH-60 Black Hawk by Dwight Booth



Navin Bopitiya's Augusta A109E Power

PHOENIX KEEPS ON RISING



Renowned developers PSS haven't wasted much time now that FS2002 has been released and have released two new aircraft for GA fans. The Piper Seneca and BAE Bulldog are both available for download from their website at www.phoenix-simulation.co.uk and are priced at a very reasonable £10.00 each. The Piper Seneca was built in GMax and shows off many of the features of FS2002 including reflections, an opening door and other touches including a virtual cockpit. Showcasing the teamwork of Graham Waterfield, Greg German, Mike Hambly, Alex Bashkatov and Bob Kirkland, the Bulldog demonstrates the advances PSS is making with each new aircraft they release. As always, there is a free manual available from the PSS support page. The manual includes pictures as well as full operating data and checklists. Both packages include plane, panel and sounds as well as a custom air file.



PC Pilot Reader Offer

Only £20.00 for two great combat expansions!



We were absolutely amazed by the success of our last reader offer for IL-2 Sturmovik. The response was fantastic and we'd like to thank everyone who availed themselves of the exclusive discount. Many readers have written to us asking if there will be other offers in the future, so here's another great opportunity to save some cash on two excellent expansions for Combat Flight Simulator 2.

Korean Combat Pilot was released last year by Just Flight to popular acclaim and brought the Korean War right to your desktop. With 14 detailed aircraft, twenty missions and two testing campaigns, CFS2 pilots had the chance to fly during the

'twilight of the props' when the peak of piston-engine technology took on the fledgling jet fighters across the Iron Curtain.

This great expansion for CFS2 normally retails for £24.99, but with PC Pilot's exclusive offer, you can start dogfighting on the Parallel for just £12.99 including worldwide postage. That's a massive saving of nearly 50% on the regular price.

However, it wouldn't be a PC Pilot offer without an even bigger chance to save, so we've also got an amazing deal for readers from our friends over at Flight One. Unlike the film of the same name, their Pearl Harbor expansion for CFS2 is a real winner, combining historical accuracy of aircraft,

scenery, upgraded clouds and 16 missions that include some unique 'what if' scenarios to test your skills. The press couldn't praise it enough when it was released and the Curtiss P-40 included in the package is acknowledged as one of the best you'll find anywhere. This also normally sells for £24.99, but for only £12.99 including postage, PC Pilot readers can get a copy delivered direct to their door.

Readers who want to span a whole decade of aviation from 1941 to 1951 can obtain both expansions for a miserly total of £20.00, including postage. The offer is only available for a limited period, so don't waste a second!

YES, I'D LIKE TO TAKE ADVANTAGE OF THE GREAT PC PILOT READER OFFER

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☐ Pearl Harbor £12.99

☐ Pearl Harbor AND Korean Combat Pilot £20.00

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HOW TO ORDER

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We offer secure online ordering from our website. Simply visit www.pcpilot.net and follow the link. Web ordering is only available to UK and European readers, for anyone outside these areas, please use one of the methods below.

Phone: 0870 900 0422 (calls charged at normal national rate).

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Fax: 01480 357186 (calls charged at normal national rate)

If you are paying by credit card, you can fill in this form (or a photocopy of it) and fax it to the above number.

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FROM
Jane's
COMBAT SIMULATIONS

DEVELOPED BY
mad.doc
SOFTWARE

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COVER CD

COMANCHE 4 DEMO

You can read the review of Comanche 4 elsewhere in this issue and if you fancy a spin in NovaLogic's latest version of their famous chopper sim, then open the folder and get flying.



MAG WITH A MISSION

We've also included an exclusive mission written for Comanche 4 by PC Pilot's resident C4 expert Kenji Takeda. The file just has to be unzipped into the user's Comanche 4 directory. It will then appear under the 'Mission Archives' missions when selecting which campaign to play. We hope you enjoy it and if it spurs you on to try your hand at mission building yourself, you can enter our exclusive competition on page 12 to win a joystick and some great C4 goodies, not to mention getting your name in lights on a future cover CD and on NovaLogic's website.

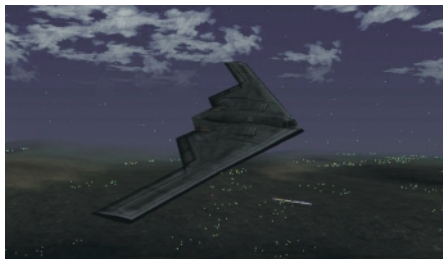
FS SCENERY ENHANCER

FSS Scenery Enhancer is the latest program from Lago that's designed to spice up your flight simulator environment. Specifically designed for FS2002, you'll find it reviewed in this issue. However, it's yet to be published in the UK so if you want a copy you would normally have to download it from Lago's website and then pay to register it. To save you a bit of time we've included the encrypted version on CD as well as the Service Pack. If you want to purchase FSSE, go to www.lagoonline.com and follow the instructions for product registration. It costs about £16.00, but at least you won't have to wait for it to download.

MOUSE AS YOKE

Here's a very handy freeware solution to a problem that many of you have noticed with FS2002. What happened to Mouse as Yoke? This useful feature has been dropped from the latest version of Flight Simulator, but help is at hand in the form of freeware developer Richard Lovett's new program that he's kindly let us include on the cover CD. Get the mouse back out of retirement!

UPDATES/UTILITIES



Get the best out of your favourite sims and make sure you've got the latest updates. We've taken the pain out of downloading them and included them on our CD.

X-Plane

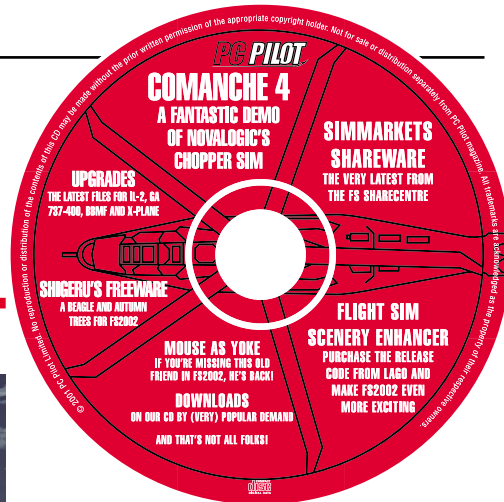
We've got the Windows updates for both versions of X-Plane. There's 5.99 for Version 5 and 6.06 for Version 6.

Greatest Airliners - 737-400

The amazing 737-400 from DreamFleet and Flight One can now be made compatible with FS2002. To find out exactly what it does, check the readme files or go to www.flight1.com

Battle of Britain Memorial Flight

There's two updates for this popular expansion from Just Flight. The first, `bbmfupdt.exe` is for CFS2 ONLY (not for FS2000 or FS2002). This update will replace the BBMF Missions and Campaign with improved versions and update several other BBMF files. It will also remove some unnecessary files from the original installation. Copy this file to a temporary location then double click on the file to start the update. Press the 'Setup' button to start the update. The second, `BBMF_FS2000_update.exe`, is the Spitfire & Hurricane roll axis update for FS2000 ONLY. Copy the file to a temporary location on your hard drive. Locate the file and double click on it. This will place the files in the default FS2000 location: `C:\program files\microsoft games\fs2000`. If your copy of FS2000 is in a different location then you will need to BROWSE to it. Press the UNZIP button to install



IL-2

The latest upgrade for this hugely popular combat sim is here. It makes a number of improvements.

Aircraft:

1. Added FW 190 A-5 as flyable.
2. Modified FW 190 A-4 and FW 190 A-5 to comply with new weapon sets.
3. Included 27 new weapon loadouts for FW 190 A-4 and FW 190 A-5.

Other updates and fixes:

1. Stall Warning will no longer appear when your aircraft is buffeted from bullet hits.
2. Reworked Bf-109 series handling.
3. An aircraft with a dead engine will no longer attempt to stay in formation.
4. Put back VSI instrument needle in Yak-9T and Yak-9K cockpits.
5. Instrument needles will freeze when the instrument is damaged internally.
6. Multi-engine bombers now open bay doors when emergency-releasing ordnance.
7. When flying in a P-39, you won't receive a 'Gunner Killed' notification anymore.
8. Corrected torque effect direction on a number of aircraft.
9. When flying in campaign mode, if you don't have an appropriate rank, you cannot select weapon set or fuel load for your wing. In the previous versions, you could change the 'Fuel' control in the arming screen, but to no effect.



Peter Dowson's utilities

Once again we've got the latest files for FS2002 from Peter, including FSUIPC and WideFS.

DOWNLOADS

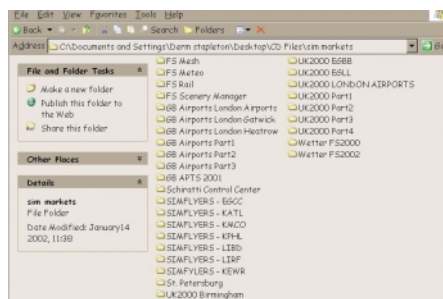
In response to popular demand... We've included the files from our Downloads section on the cover CD. It was getting

increasingly difficult to recommend Internet sites from which to download freeware to readers, as files constantly change location, you often can't find them even by searching, and we've even heard of difficulty in getting to sites. This should all be a thing of the past and, with a full feature on how to install files in this issue, you should have plenty of fun with this freeware feast.



SHAREWARE

There are lots of programs around that you can try before you buy and the place to go for them is the FS Sharecenter, which is part of the SimFlight Network at www.simmarket.com. We've got loads of great programs for you to try, including Gary Summons' excellent UK2000 series, FS2002 updates for SimFlyers scenery, Wetter 2000, FS Scenery Manager, FS Rail and more. To find out all about this software, for costs and to register, go to www.fssharecenter.com or www.simmmarket.com



CHARTS

The charts for our latest tutorial are included on the CD in easy-to-use PDF format. If you have any trouble accessing the charts go to 'My Computer', right click on the CD icon and select 'Explore'. You can then open the folders as required. We have also included the charts for our feature on using an FMC.



SHIGERU'S FREEWARE

A regular contributor to PC Pilot CDs is Shigeru Tanaka and for this issue he's kindly offered us his excellent Beagle for FS2000 Pro and also a very beautiful texture that will improve your autumn trees in FS2002.



VIRTUAL AIRLINES

For reasons of space we can no longer include our Virtual Airlines page at the end of the magazine. However, we've put the latest list of VAs on the CD and also included a small description of each airline to help distinguish between all these great online airlines.

IMPORTANT - TECHNICAL SUPPORT

The CD and software on it is free and as such, neither PC Pilot, nor any of the publishers or developers of the software supplied on the CD can provide technical support. The software is supplied very much 'as is' and without support. Enjoy the CD and the software on it!



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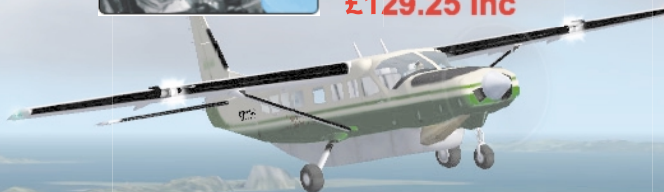
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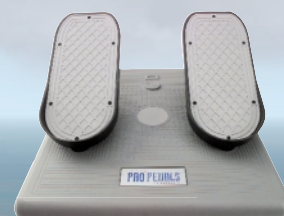
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Go Flight Controls

MISSION (to be) ACCOMPLISHED



Flushed with success at discovering our new mission building skills in Comanche 4, we thought it would make a great competition if we asked those of you out there with Comanche 4 to try your hand at building an exclusive mission for PC Pilot. As there's a bit of work involved, we thought some good prizes would need to be dangled in front of your eyes and NovaLogic certainly did us proud. We've got two first prizes that include a Thrustmaster Fox 2 joystick, assorted C4 goodies, including a body warmer and fishing stool, plus some great NovaLogic games.

However, we're aware that mission building might not be everybody's cup of rough cider, so there's a second part to the competition that anyone can enter if they answer a couple of simple questions. There's a whole truckload of free software for this one that we'll divide amongst the first eighteen correct entries out of the mailbag.



COMPETITION ONE

To enter the mission building competition you need to build a unique mission for Comanche 4 and send it in a zip file to c4mission@pcpilot.net to arrive no later than 31st March 2002. Any entries received after this date cannot be included. You should also include a brief description of your mission in not more than 150 words in the body of the e-mail. Entries can also be sent to us on floppy disc or CD-R to:

PC Pilot C4 Missions
PO Box 11
St. Ives
PE27 3GW
UK

Missions will be judged on imagination and originality and also rated on how much fun we have flying them! As a bonus to the prize, we'll include the winning mission on a future cover CD and it will also be posted on NovaLogic's site for Comanche 4 fans to download. All entries to Competition One will also be automatically entered in Competition Two and won't have to answer the questions or enter separately.

COMPETITION TWO

All you have to do is correctly answer the following questions:

1) The stick that makes helicopters go is called:

- a) The Collective
- b) The Reflective
- c) The Jostick

2) When will you be able to buy a real RAH-66 Comanche (assuming you have the cash)?

- a) 2003
- b) 2004
- c) 2006

The competition is open to PC Pilot readers from anywhere in the world with the exception of PC Pilot and NovaLogic staff.

You can send your answers by e-mail to c4comp@pcpilot.net or on a postcard/back of an envelope to:

PC Pilot C4 Competition
PO Box 11
St. Ives
PE27 3GW
UK

Please make sure that you clearly state your full name, address and e-mail address (if you have one). The competition closes on 31st March 2002. Entries received after that date cannot be included and prizes will be drawn at random from correct answers.

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Sabre vs. MiG

Time for a Korea change?

Following on from their success with the excellent Pearl Harbor (see the reader offer elsewhere in this issue), US developers Flight One have moved forward in history by almost a decade to June 1950. Their latest offering, titled Sabre vs. MiG will offer CFS2 flyers the chance to do battle in the Korean War, arguably the first proper conflict between jets. Much of the action takes place over the infamous MiG Alley; the airspace in the north western corner of North Korea.

There are going to be 12 aircraft in the package, made up of seven flyable types and five AI (artificial intelligence). The ones you can get behind the controls of are F-86s, MiG 15s and an F-51 (the old P-51 Mustang re-designated for the USAF). The ones that your PC will be piloting are the B-29 Superfortress, Tupolev Tu-2 bomber, Yak-9, F-84 Thunderstreak and F-82 (the weird-looking Twin Mustang). The developers have said that the aircraft in Sabre vs. MiG will

display many real CFS2 features typically not found in third-party aircraft, like rolling wheels, sliding canopies, pilot ejection, jet exhaust trails, speed brakes, working shocks and suspension, fully rendered virtual cockpits with working gauges, and working drop tanks.

We're also told that the program will include scenery, ten airbases and 20 CFS2 missions with four campaigns that should keep you busy over the parallel for quite a while. One feature we noticed in our quick perusal of an early version was that there are custom screens to replace the distinctive 'comic' menu screens of CFS2. Flight One got a well deserved round of applause from the whole PC Pilot team for this one. A constant niggle with many add-ons is when your flight in a Sopwith Camel, for example, is preceded by graphics designed around the Pacific theatre of operations.

We were slightly disappointed to see that the rest of the UN forces were a bit thin on the



The Sabres are lined up ready for action...



...but so are those pesky Reds!

ground in this version of Korea. Whilst MacArthur's men formed the largest contingent, there were a few Brits and Aussies making up the numbers and they generously brought their own aircraft to the fray. A Sea Fury or a Meteor would have been welcome. However, that doesn't detract from the high quality of what we've seen so far. Pearl Harbor was a corker of an expansion, but could well have suffered from the bad publicity surrounding the film of the same name. Hopefully no such fate will befall Sabre vs. MiG, unless Mr. Bruckheimer is planning another celluloid rewrite of history!

The software is available for download at www.flight1.com but the boxed version is being published in Europe by Just Flight and will probably be available by the time you read this.

Derek Smalls



"Take that, enemy of democracy!"



The People's air force fighting back



A Russian view of world affairs



Yippee!!! A custom screen for CFS2

Preview Information

Publisher: Just Flight

Price: £24.99

Website: www.justflight.com

Developer: Flight One

Expected Release Date: February 2002

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Comanche 4

NovaLogic claim another scalp



Watch out for that rotor wash



Down and dirty, where chopper pilots like it



Mention stealth aircraft to most people and they'll probably think of the US Air Force, as images of the angular F-117 or smooth B-2 flying wing spring to mind. By the time 2006 comes around the US Army will have its own stealth predator, but this one is of the rotary-winged variety – the RAH-66 Comanche. While the real aircraft won't enter service for another four years yet, NovaLogic is already onto its fourth in-service upgrade. The Comanche series has sold over two and a half million copies since it first blasted onto the screens of our 386 PCs a decade ago.



The Comanche is feared at sea and on land



Close air support missions include heading downtown to evacuate the President

This latest incarnation promises to be as revolutionary as its predecessors. Way before the days of dedicated 3D graphic accelerator cards NovaLogic introduced us to the wonderful world of voxels; these volumetric pixels provided unprecedented depth to the 3D world. Unfortunately for NovaLogic, 3Dfx, and now nVidia and ATI, put an end to this technology. Comanche 3/Gold showed how outdated the voxel approach had become; it was blocky and slow on even the fastest of machines, as the graphics engine was unable to take advantage of modern graphic accelerators. So NovaLogic has bitten the bullet this time around and started from scratch with a state-of-the-art polygon-based graphics engine that takes advantage of every feature going: Transform and Lighting, multi-texturing, vertex and pixel shading, you name it. And boy, does it look stunning!

Ground force

Low down amongst the long grass and trees is where chopper pilots love to be, and this environment is rendered with unerring realism. NovaLogic has borrowed heavily



Helping Delta Force rid the world of terrorists



Multi-function and head-up displays tell you all you need to know

from its Delta Force first-person commando shooter titles, and the level of detail here is every bit as good. Infantry and mechanics mosey around in an extremely lifelike manner, thanks to the same motion-captured graphics from Delta Force being used here. Vehicles are highly detailed and fully articulated too, rivalling those in any simulator to date.

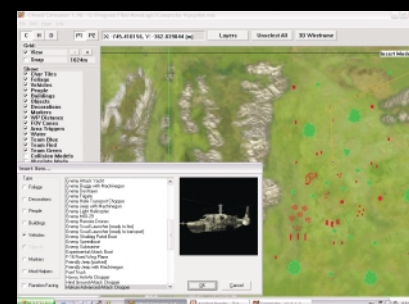
Clusters of trees, patches of long grass, and water that ripples and reflects in a wholly realistic way provide an amazing backdrop to the action.

As you crank up the collective your helicopter kicks up a healthy cloud of dust; not only that, but trees will also sway under your rotor wash and any nearby troops will turn away and shield their faces, such is the attention to detail. Over water the wash effects are even more amazing. The ground undulates in a natural manner, with rolling hills and deep valleys through which the Comanche can play its deadly game of hide-and-seek. Hacking along just a few feet off the ground is truly exhilarating, exaggerated by the incredible agility of this next-generation aircraft.

Construction Corner

One thing's certain with Comanche 4 – the missions are more Rambo than reality; this is a shame, as the game engine is more advanced than most arcade shooters but doesn't get to shine to its full potential. NovaLogic has included a rather slick mission editor to rectify this, enabling users to create more realistic scenarios for both single and multiplayer use. Based on the one used by the development team, this is a feature-rich tool that requires a little learning. Luckily there's a short PDF manual to take you through its main features, and we were easily able to create a brand new mission after just a couple of hours.

Several terrain maps are included, and tiles for ground features such as roads and railways allow you to create man-made landscapes. Buildings, vegetation and fences, as well as vehicles and people, can all be added with a click of the mouse. Some of the more advanced features are full support for layers, allowing you to organise items as you see fit, area event triggers and waypoints for computer-controlled vehicles, both friendly and hostile. Saving and testing missions is a breeze; just export them from the dropdown File menu and [Alt]-[Tab] over to Comanche 4 to jump in and try out your new creation. With such a powerful tool included with the game we're sure that support will be strong from the user community; don't keep any missions to yourself, as everyone's invited to this party. To see our first attempt check out the simple PC Pilot mission on the cover disc. Enjoy!



The mission editor is fully featured and provides limitless opportunities to extend the action

It's even better when you start taking out targets. The explosions and pyrotechnics are astounding movie-quality fireballs, straight out of the biggest Hollywood blockbuster. Combine this with some thumping sound effects, the full complement of cockpit cacophony, and gunfire galore to keep your heart racing.

Buy...load...fly

NovaLogic has a reputation for producing games that are easy to get into and so they are often scorned by hardcore enthusiasts. With this latest flight sim they've even gone as far as providing Quake-type controls for flying. It's strange but true, but the default controls are the mouse for pointing, and



Wreaking havoc at the local terrorists' ferry port

WASD keys for moving (W and S for moving forwards and backwards, A and D for left and right). This works fine if that's what you're used to, but don't panic, traditionalists can use joystick, throttle and rudder controls too. In fact the real Comanche is the first helicopter to use a twistgrip joystick for fantail control, so that Microsoft Sidewinder joystick is more realistic than you think.

To make life especially easy it's possible to use preset flying altitudes – low, medium and high – so you don't even have to worry about being exact with the collective control. Various other options are available, such as using the hat switch to change

weapons, although unfortunately you can't use this to pan around the cockpit. To do this you have to use the mouse in Freelook view, which is toggled using the [F4] key; unfortunately this is only possible when using the mouse/key controls, thus making it useless for those of us who prefer a joystick setup.

21st Century sensation

As you'd expect of such a modern machine, flying is very easy indeed. The simplified controls mean that the advertised five-minute learning curve is entirely apt. Training missions are included so novices can hone their flying and weapons skills,



Try the first-person view for a wider angle on life

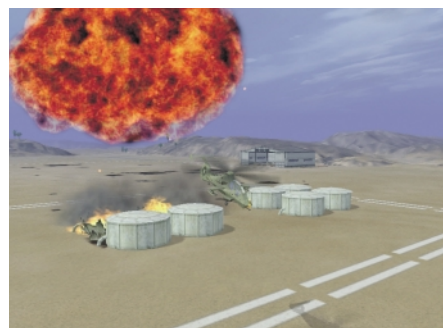
and for flight sim veterans the flight model can be scaled up to include full inertia effects and the removal of cyclic control limits. The helicopter certainly seems super-agile, and will seem overly so to many.

One should remember, however, that this is the first helicopter to be designed with super manoeuvrability for air combat as a top priority; the ability to travel up to 70 knots sideways, for instance, is indicative of the extreme power of the tail rotor. This translates into an ability to yaw the chopper in full forward flight. At first this seemed wholly unrealistic to us, until a documentary about the Comanche showed the prototype perform exactly the same manoeuvre at the hands of a Boeing test pilot.

One characteristic we did notice was that the collective can seem a little sluggish in Comanche 4, although this may actually be because we were entering a vortex ring state during a rapid descent in the hover. In forward flight the collective does seem more responsive, and the documentation does warn of the dangers that ground effect can provoke. Our feeling is that the flight model isn't as far off as it first seems, mainly because the extraordinary flight



A real all-action hero - eat your heart out Arnie!





Taking it to the enemy, US Army-style

characteristics of the real Comanche actually do seem unrealistic when compared with existing helicopters. What it does give you is a reasonable feeling of what it's like for a fully trained army pilot to fly a combat helicopter.

Rotor craft are hard to tame, and flying them effectively in combat takes lots of full-time training – something that most of us don't have. This was confirmed in recent conversations with the British Army's chief test pilot for the Apache programme, who explained in detail many of the difficulties faced by chopper crews. And remember, this is a two-crew ship but in the game there's only you, so it's only a stylised representation of reality. Gunship! did try, but failed to provide a true representation of this crew arrangement, allowing you to switch between front and back seats. The automatic height control makes flying map-of-the-earth a lot easier, and there's a pop-up mode that maxes out the collective so you can peek over ridges too. Unfortunately there's no hover-hold feature, something that is part of the real aircraft's control system, so it's all too easy to creep forward over a ridge line after popping up and shooting a few targets.

The realism of the flight model may be debatable, but one thing is for sure: the missions are straight out of a war film; take off from your base and within a minute or two you're in the thick of things. More often than not there are literally dozens of enemies, sometimes with whole swarms of enemy helos after your blood. Weapons loadouts on the Comanche are realistic though, making life extremely tough; even lowering the difficulty level to Easy isn't a guarantee of success. This can prove frustrating as the campaigns are purely linear, preventing you from progressing until you have completed each mission.

While purists may not like this arcade game approach, the missions are ideal for those wanting an instant adrenaline fix without having to fly the long outward and return legs of typical real helicopter missions. The 30-odd missions certainly are a lot of fun and are definitely a challenge. A glaring omission from Comanche 4, though, is the lack of night missions. All stealth aircraft fly primarily under the cover of darkness, but not here unfortunately.



Welcome the New World Order



A splash-and-dash refuelling and rearming stop at the local FARP

It may be a decade since its first inception, but the latest in the Comanche series continues to push the boundaries of PC technology. The audio-visual experience is astonishing all round, delivering an exhilarating low-level combat experience; for beginners it's an ideal introduction to this punishing area of operations. The advertised scalable flight model may still seem overly simplistic to some, but it actually handles very smoothly, allowing you to concentrate on fighting rather than flying. The biggest downside is the purely linear mission structure, although this does make the game devilishly addictive – and the mission editor is a gem. We spent a little time debating whether to give this three or four stars, but the bags under our eyes are testament to Comanche 4's pulling power, and we just kept coming back for more. Empire's Enemy Engaged: Comanche Hokum is still first choice for the hardcore, but we're definitely keeping Comanche 4 on our hard drive for those times when we want some instant gratification.

Kenji Takeda

Party On!

Comanche 4 follows in the NovaLogic tradition of providing excellent multiplayer capabilities but you'll need the multiplayer update to take advantage of these. The Novaworld web portal provides a one-stop shop for online duelling for all of NovaLogic's titles, and is accessible from within Comanche 4 once you've dialled your ISP for a web connection. Deathmatch, team deathmatch and co-operative games are supported for up to 16 players at a time. All-against-all deathmatch scenarios may not be realistic, but they are certainly a lot of fun. Team deathmatch and co-op may be more appealing to hardcore enthusiasts, and there's always the option of creating your own multiplayer missions too. Online combat certainly seems to be growing in popularity, so why not broaden your horizons and give it a try.

Review Score ★★★★★

Publisher: NovaLogic

Price: £29.99

Website: www.novalogic.com

Developer: NovaLogic

At a glance: An action-packed sim for those who want instant action. The graphics are the best we've ever seen, and the overall package is a slick one – ideal for novices. The multiplayer action and mission editor add longevity, but hardcore enthusiasts may find the whole experience a little lacking in depth.

System Requirements: PII 450MHz, 128Mb RAM, 16Mb 3D graphics card

Recommended: PIII 700MHz, 256Mb RAM, 32Mb 3D graphics card

UK2000 Part 4

East Anglia and North London

The Fens...not as dull as they seem!

We have been huge fans of Gary Summons' scenery ever since he began his mammoth project to make all the UK airfields as photorealistic as possible. With the Channel Isles, the Southwest and the Southeast under his belt, Gary has now produced East Anglia and North London, which includes Heathrow, Stansted and London's City Airport, well-known watering holes for aviation enthusiasts such as Duxford and Lakenheath, and many disused RAF and USAF bases.

Flight Simulator 2002 is wonderful in its depiction of scenery in the USA, but does seem to get progressively less accurate the further away you fly! Without wanting to accuse American programmers of parochialism, we just feel lucky to have someone like Gary around to help put things right, and he does this superbly. His latest release lives up to his usual high standards, with scenery by day and night enough to make you gasp with delight at times. If you want people populating the passenger terminals, you've got them, along with buses, baggage vehicles, dynamic aircraft, radar aerials and much more; if something is to be found in the real airport, then it will be superbly modelled in UK2000 Part 4. If you make use of the slow mode you can have a lot of

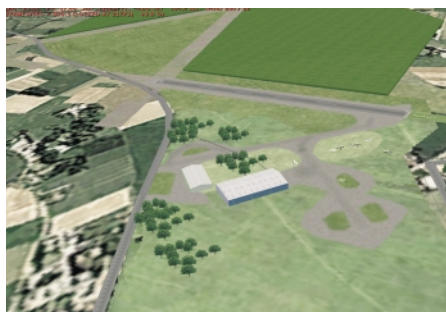
fun just exploring the bigger air terminals and seeing what details appear, and we guarantee that you'll be pleasantly surprised by what you find.

As much care has been lavished on details in the small airfields as in the large terminals, and this scenery is full of those little touches that can sometimes quite unexpectedly bring the simulated world to life. Taxi round the corner of an RAF hangar and you could come face to face with a gleaming F-15 or an RAF transport van, and at civil airports you'll need to be aware of moving luggage trolleys and transfer buses. Shortly after starting up a Cessna on the apron at Cambridge we had to suddenly brake hard as a Piper crossed our path – very realistic. Then there are those soulless RAF buildings at Marham and Wattisham that will remind some people of their most boring National Service days; these are so authentic that you can almost feel the biting winds blowing around the control tower.

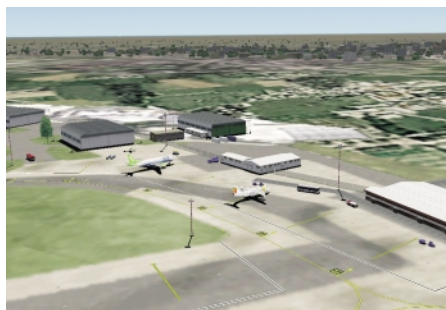
Gary's new scenery is perfectly compatible with FS2002 (but you'll need a patch to install it into FS2000) and looks terrific set amongst the new default scenery; at last there's an environment which is almost good enough to match the airports he has given us. This latest package contains 33 airfields, and a host of dynamic scenery and aircraft, but even so the frame rates on our 750MHz machine were hardly affected, even with all the sliders pushed to the right.

The scenery is available from Gary's website, with a £5.00 discount offered to owners of London Airports, and you can even download a free demo version if you need convincing. The download is a hefty 40Mb, so it's probably worth paying a little more for the CD version.

Christopher Jarman



Beccles – even your local airfield gets a facelift



It's all happening at Norwich



Executives gather at Earl's Colne – "Nice plane, Charles!"



Bright lights, big city – London City Airport at night



No shortage of dynamic aircraft at Cambridge



Duxford, including the American museum



Military technology under wraps at Lakenheath



Heathrow on a quiet day!

Review Score ★★★★★

Publisher: Gary Summons

Price: £20.00 download (40Mb); £23.00 CD

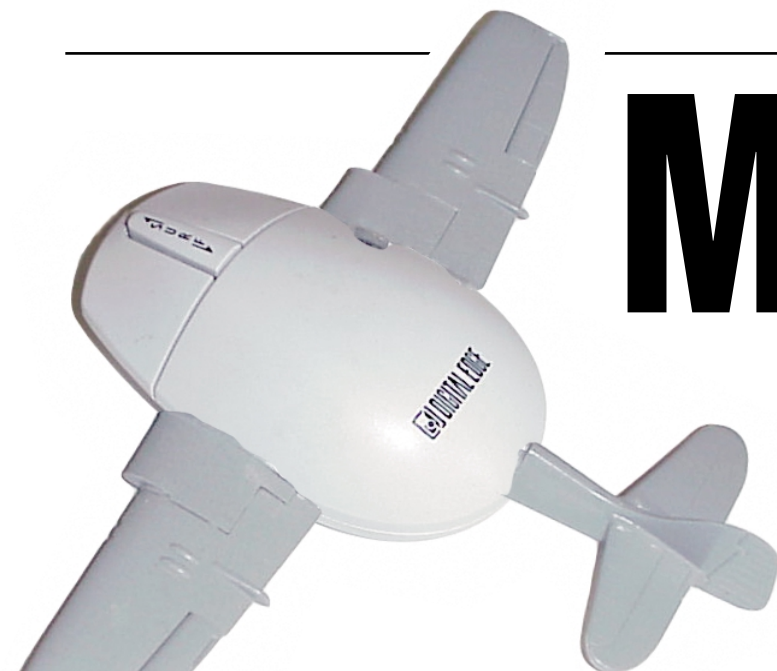
Website: www.uk2000scenery.bizland.com

Developer: Gary Summons

At a glance: Another part of the UK is brought to life. Essential for UK enthusiasts who enjoy flying GA aircraft around the smaller airfields.

System Requirements: Pentium 450MHz, 64Mb RAM, 8Mb 3D graphics card

Recommended: Pentium 800MHz, 128Mb RAM, 64Mb 3D graphics card



Mouse as Yoke

Die Fledermaus is Back!

The omission of the Mouse as Yoke feature in

Microsoft's FS2002 is a small change from all the previous versions of Flight Simulator, but one which is the cause of much frustration. Whether this was an oversight (which we doubt) or deliberate, it has been the cause of much speculation in the newsgroups. The list of people who want, and in some cases need, the mouse for their virtual flights includes those with no joystick who cannot manage the keys to fly with, and the large number of disabled flight sim enthusiasts. Some use their nose, chin, or a mouth stick, and for many a mouse is easier to deal with than either a joystick or the keyboard. The Mouse as Yoke facility was also appreciated by those who enjoy a little surreptitious flying during quiet moments in the office.

It's a great pity, therefore, that Microsoft has seen fit to remove this excellent facility, and we can only hope that there will be a patch to replace it very soon. In the meantime, however, Lovett Software's Richard Lovett, who is himself a disabled programmer, has produced a freeware program called Mouse

as Yoke, which you can find on this month's cover CD.

Mouse as Yoke actually provides a great deal more than the original facility, and although getting the hang of it is initially complicated, it's well worth persevering. Installation is quick and simple on versions of Windows up to 98, but for Windows XP you will need to use the Compatibility Wizard in Windows 98 mode to get it working. After installation a dedicated icon will appear on the desktop, and a click on this will bring up FS2002 including the new mouse facility. A small window called Mouse as Yoke will appear on your screen and you can then deal with a number of options for regulating the mouse sensitivity. It's best to leave these on the default settings until you have learnt more about the program.

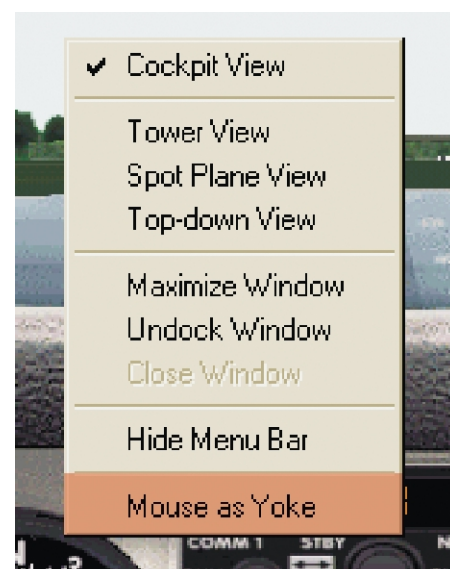
Once you're actually in your aircraft, Richard's software works best in Spot Plane view, and the bug causing difficulties while cockpit flying has now been fixed. A tap on the spacebar turns on the mouse facility, and a series of messages will appear across the top of your flying screen; these refer to the various modes of operation.

L= Aileron/Elevator mode, for example, means that a click on the left mouse button (do not leave it pressed down) will cause the mouse to work intuitively as the yoke. The [Page Up] and [Page Down] keys will still act as throttle in this mode, and many will be happy just to fly in this way. We found that the program worked fine with both a standard and an optical mouse, as well as with the touchpad on laptops.

Clicking on either the left or the right mouse button will cause the message strip across the screen to change to other operational modes, such as R=Rudder/Flaps

mode and so on. Pressing the buttons will rotate the various modes for you; the Brakes and Throttle mode seem to work by moving the mouse from side to side. A complete Help file is available and, for those who are happy to delve into folders, you'll also find a text file with some instructions. This is a very clever program, and one which we can fully recommend, but getting the best out of it demands a steep learning curve, and persistence is required if you want to use the full range of facilities.

Christopher Jarman



A useful feature, mysteriously missing from FS2002

Review Score ★★★★★

Publisher: Lovett Software

Price: Freeware

Website: Available on the cover CD

Developer: Richard Lovett

At a glance: Much needed software generously donated. Particularly useful for some disabled simmers and laptop flyers



"Those accounts you need? I'm working on them..."

VOR/NDB Simulator

Always know your place...or at least your position

Whether you fly in the real or the simulated world, navigation is an important subject that, once mastered, will make your flights more enjoyable; it will give you time to take pleasure in the scenery around you, while at the same time ensuring that you reach your intended destination. The cockpit electronics and advanced GPS facilities found in modern aircraft simplify the problem, of course, because getting to grips with VOR and NDB navigation is not for the faint-hearted.

Help is at hand, however, in the form of a new series of tutorials from an American company called Aviation Tutorials. These cover a variety of navigation instruments both from a ground school perspective and from a more practical standpoint using the inbuilt simulations. They are very professionally produced, with high-resolution graphic displays that positively exude quality, both in content and presentation. The product we looked at, VOR/NDB Simulator, deals with both the traditional VOR and the combined VOR/HSI instrument; it also covers the traditional NDB instrument and its modern counterpart, the combined NDB/RMI. If you're new to flight simulation then you may not have investigated these instruments yet; you'll find nevertheless that they are essential for navigating under IFR conditions.



All options are accessed from the main menu

The CD package is fully self-contained, with detailed instructions on the elements common to each section of the tutorial, as well as more specific instructions for each instrument. These are presented in an almost simplistic

format, which in this case is certainly not a criticism; it simply underlines the thought that's gone into the whole project. Having said that, it is advisable to have some basic knowledge of NDB and VOR instruments (particularly how bearings and radials work) in order to get the best from the simulations.

The program is structured so that, once you've run through the tutorials, you can practise all the elements it covers, including course interceptions, position finding, NDB and DME holds, and tracking both towards and away from NDBs and VORs. In short, all the possible instrument scenarios you're likely to encounter in the cockpit. You can move the VOR or NDB stations in order to create your own scenarios, and also move the aircraft or hide it from view to ensure that



The function of each instrument is clearly explained

Glossary

- VOR** – VHF Omni-directional Range
- NDB** – Non-Directional Beacon
- HSI** – Horizontal Situation Indicator
- RMI** – Radio Magnetic Indicator
- IFR** – Instrument Flight Rules
- DME** – Distance-Measuring Equipment



Just head for that great big arrow



You mean we're actually on track?



Now is that your left and my right or...



I think those instruments are multiplying

whoever is using the simulation understands the readings in front of them, and is not simply flying the needles.

As the screenshots demonstrate, the displays are clear and easy to read, and keyboard alternatives are provided for most of the on-screen controls. The system should be useful for flying schools and for anyone taking flying lessons, because it's considerably easier to make sense of what the instruments are telling you when you haven't got half a dozen other things to worry about at the same time. It's also much cheaper than the average £85.00 per hour that flying clubs charge.

Joe Lavery

Review Score

Publisher: Aviation Tutorials

Price: \$69.00 (about £50) from the USA only (+p&p)

Website: www.avtutorials.com

Developer: Aviation Tutorials

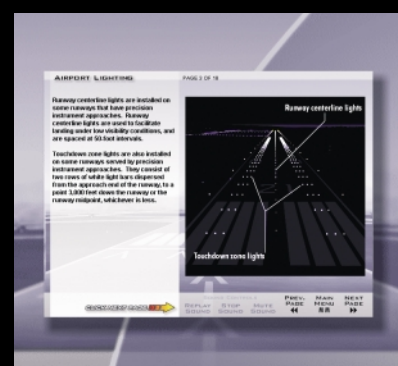
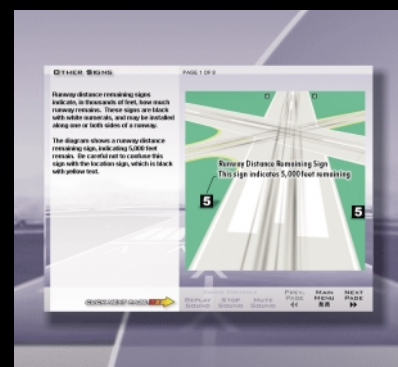
At a glance: This should provide the ideal opportunity to brush up on those essential navigation skills.

System Requirements: PII 120MHz, 32Mb RAM, 3D graphics card

Recommended: PIII or Athlon 400MHz, 64Mb RAM, 3D graphics card

Stay safe on the ground!

These screenshots are from the Getting Around on the Ground tutorial, designed to assist you in safe airport ground operations. It will help you find your way around airports, and covers correct procedures and the various types of runway signs, lights and markings you can expect to encounter. It also outlines the very real dangers of runway incursions. Unlike the VOR/NDB tutorial, this is a multimedia product complete with sound and video animations, and is priced at a very reasonable \$29.00 (about £20.00).



Echelon

It's us against, er... them!

Although we are all dedicated flight simulation fanatics, occasionally we feel the need to let our hair down and get on with some serious carnage. Echelon, from Buka Entertainment, lets you do precisely that; it's a futuristic space shoot-em-up with, shall we say, an 'interesting' flight model.

There's no calling the tower for clearance, or messing about with navigation – just get up there and beat seven bells out of anyone or anything that dares to get in your way. What we have here in fact is almost a cross between Star Trek and Star Wars, complete with around a dozen craft that wouldn't look out of place in the race across the desert in the Phantom Menace. The storyline tells us that after millennia of conflict we humans have finally settled our differences, only for a forgotten race left over from the last empire to come along, hell-bent on getting the whole shooting match rolling again. So your task (should you accept it) is to join the Galactic Federation in order to protect the galaxy from these rather skilful pilots (at least they are when you're doing your level best to blast them to pieces with an enormous plasma cannon).

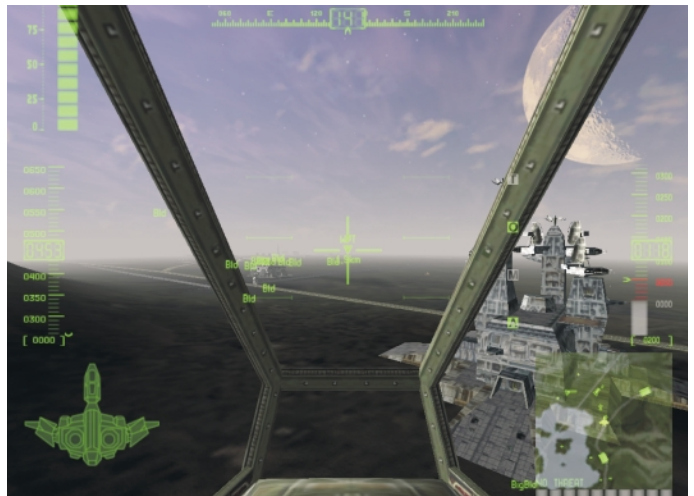
The action takes place over a vast and varied landscape which, we have to say, is rather nicely rendered. Although for the most part it

tends to consist of barren rocky locations, for some reason it has an almost X-Plane look about it. That's not meant as a criticism by the way; it's just that the sky shading and the overall feel of the flight model seem to fit the smooth X-Plane profile. Having said that, we have to say that the lens flares, explosions and particle rendering are superb – better in fact than any flight simulator on the market. Anyway, enough of admiring the scenery; we have a job to do...

As you would expect, there are plenty of weapons to choose from, and a few training missions are provided to allow you to familiarise yourself with this unusual arena. You'll then be ready to take on the burden of saving the human race from total domination. You can choose from a range of instant action missions, or try a more in-depth experience with one of the campaigns; alternatively you can take advantage of the LAN or Internet multiplayer support and beat up a few friends.

The authors tell us that all 14 Echelon craft have accurate flight models, which they may well have. Unfortunately we don't have any staff pilots who have logged flying hours in spacecraft! But seriously, and to be fair to the developers, we would like to see a few genuine flight simulators with such a smooth graphic engine. Every vehicle is individual, and they all have different flight characteristics; some are swift and agile, while others are heavy and have the inertia of an elephant in a dump truck.

At the end of the day Echelon is really just another 3D shoot-em-up, albeit a hugely enjoyable one, with a minimal story line that requires very little preamble before you



The city by moonlight



The hills are alive...with your enemies



Don't look now, I'm behind you!

can get stuck in. If you're a fan of the genre then you're sure to enjoy it but, like the flight simulators we are all so passionate about, it's an acquired taste.

Joe Lavery



Begin by amassing a formidable arsenal



That's not the Severn Bridge...idiot!



Well, it looked like the Severn Bridge to me

Review Score 

Publisher: Akaei

Price: £25.00 approx (from the website)

Website: www.akaei.com

Developer: Madia/Buka Entertainment

At a glance: Nothing like a bit of gratuitous violence after a hard day at the office! Not really a 'proper' flight sim, but there are no trains in it!

System Requirements: PII 266MHz, 64Mb RAM, 3D graphics card

Recommended: P4 or Athlon 1GHz, 256Mb RAM, 3D graphics card

Sky Ranch



Explore the not-so-wild West

Eclipse 500 at Brice

One of the first commercial add-ons we've received for FS2002 is Sky Ranch, which is the latest offering from Abacus, modelled on a planned real-world airport community in Utah, USA. The package consists of five new aircraft for you to fly from a home base called Sky Ranch, situated just six miles south of the town of Hurricane. This is one of a growing number of such communities in the US, formed by groups of people who have built their whole existence around their passion for aviation.

Abacus invites you to explore the area around Sky Ranch in a series of Round Robin adventures that encompass some of the most spectacular scenery found in the USA. The flights are provided in separate legs so you don't have to fly the whole plan in one day, and you can explore the Zion National Park, the Grand Canyon, Arches National Park, Canyon Lands National Park, Glen Canyon, Las Vegas and Lake Powell. This makes a total of three exploratory trips split into nine legs. The authors have included start-up situations for each leg for any of the five aircraft which, incidentally, load with the radio frequencies for the first leg preset. You also get a set of flight maps showing the VOR frequencies and the distance between each leg; these are supplemented with Adobe

Acrobat files on the CD showing screenshots of various landmarks along the way.

The aircraft are fair representations of their real-world counterparts and come with nicely designed panels complete with virtual cockpits. Some of these seem to have migrated from Abacus's Premier Collection, which is simply an observation, as they look good and fly very well. There is one exception, however, and that's the Piper Arrow II. It's easy to see that this aircraft wasn't designed by the same team, because the modelling is very basic for a commercial package. To underline the fact, take a look at the screenshots of the Piper and a freeware aircraft designed by Rien Cornelissen. What do you think?

On the positive side the Arrow panel, in common with all the panels, is particularly well done; it's designed so that all the controls are on screen at once, including the radio stack, which has switchable main and standby frequencies for both the COM and NAV radios.

The flights themselves are like any other flights, both interesting and boring at the same time. This is particularly true over desert areas or water, because flying is like that...isn't it? ■

Joe Lavery



Aztec over the Grand Canyon



Over the strip in Las Vegas



The Abacus Arrow – very basic shape and textures



A freeware version - much better overall. Notice the panel lines and fine detail



Cessna 310 Cockpit



Arrow panel

Review Score ★★★★★

Publisher: Abacus

Price: £19.99

Website: www.abacuspublisher.com

Developer: Abacus

At a glance: Enjoy some of America's natural treasures in this round robin package from Abacus, although a ropery Arrow lets it down.

System Requirements: PII 400MHz, 128Mb RAM, 16Mb 3D Accelerator

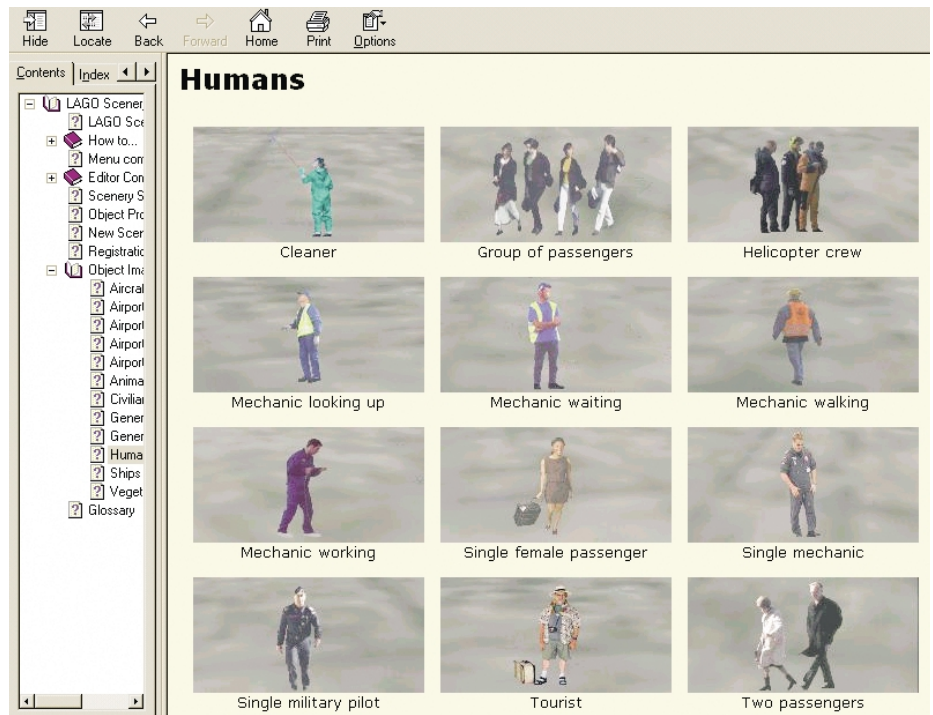
Recommended: PIII or Athlon 1GHz, 256Mb RAM, 64Mb 3D graphics card

FS Scenery Enhancer

Worldwide property boom imminent!

An appreciation of the finer points of architecture may not be our strong point at PC Pilot, but at the moment a lust for construction has taken hold of us all, and we are obsessively creating scenes, villages, fleets of aircraft, and our own little worlds. The scenery in Flight Simulator 2002 is already streets ahead of Microsoft's earlier efforts, and now Lago has released a product to improve it even further; it's called FS Scenery Enhancer, but it is actually more of an object-placing program. We thought at first that the 'Enhancer' was going to turn the fields greener, the clouds fluffier, and the seas a more pleasing shade of blue, but no, this program lets you add a variety of features to your simulated world.

The demo version (around 17Mb) can be downloaded from Lago's website at www.lagoonline.com, or to save your phone bill there's a copy on the cover CD that just needs to be registered at their site. Once you've done this you're unlikely to be disappointed. FSSE comes with full instructions in an Adobe Acrobat format and its own Help file. There's a Quick Start section, which suited us and, if you keep your wits about you, buildings and trees can liven up your favourite location within five minutes. The demo only allows you to place three objects per scenery area, so if you want any more you'll have to pay up; the demo performs really well, and sampling the full range of features will certainly entice you into wanting the complete experience.

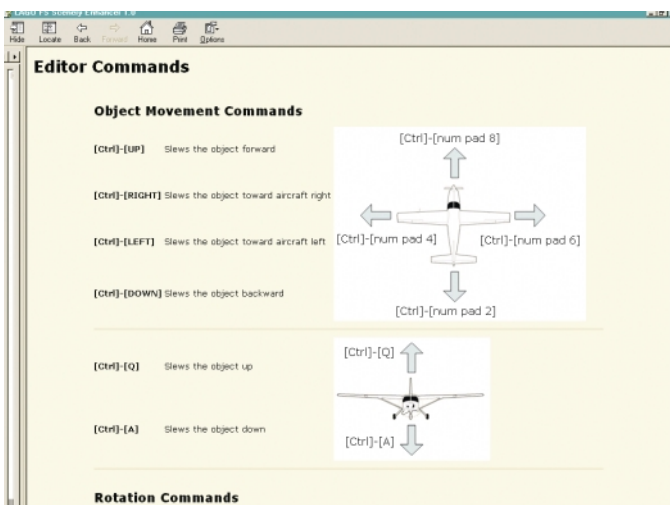


All human life is here

Once the program has been installed, Lago's menu appears on the FS2002 taskbar (the one that appears when you press [Alt]); just select Scenery Editor and you're in business. Up comes a window asking you to name your scenery, and then click OK. The controls are all worked from the keyboard, so the first keys to press are [Ctrl]-[Insert] for a small window showing a picture of an aircraft and a list of twelve categories for you to select. There are around 250 available objects altogether, including generic buildings, aircraft, civilian vehicles, animals, humans, vegetation and so on.

Apparatus such as airfield illuminations will actually cast light at night, although as yet there is no dynamic scenery. Hopefully an upgrade will make this possible.

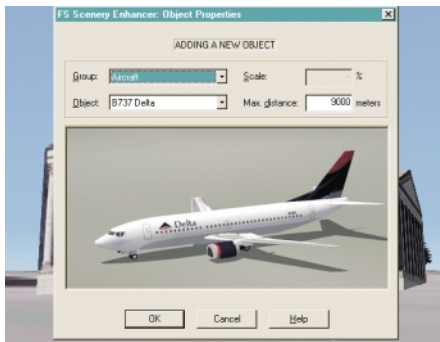
Once you have chosen an object it appears in front of the aircraft in which you are sitting, and is connected to you by a white line. A simple combination of keys allows you to move this object to the left or right, and to turn or even tilt it, until it is exactly where you want it. This does take some practice until you realise that you only need to give the keys three or four small taps at a



The usual slew controls aid easy placement



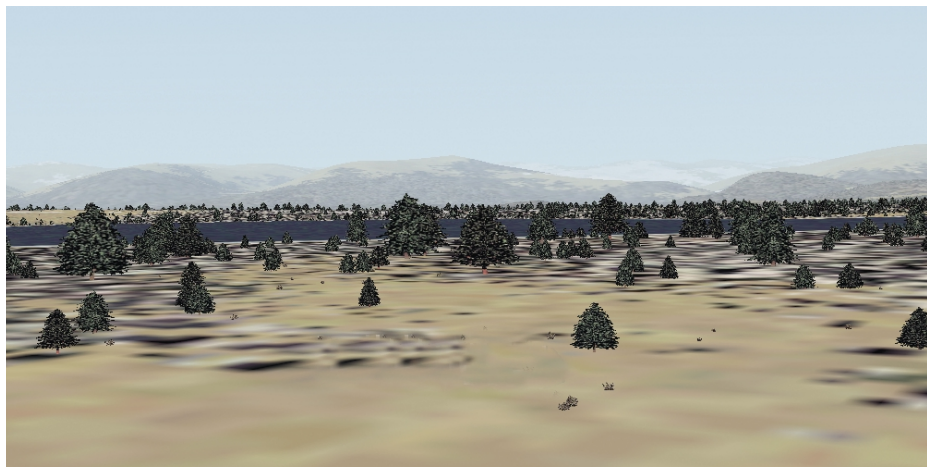
Even our Publishing Director's house is included



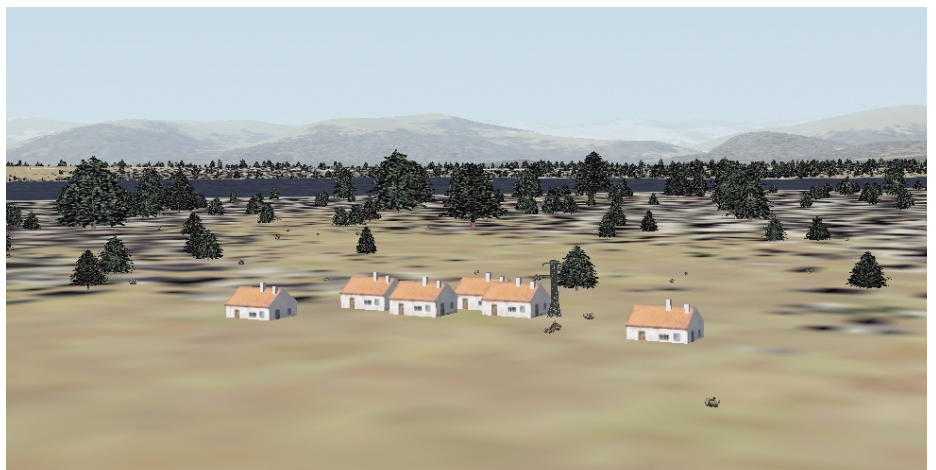
Take your pick of the goodies available

time rather than hold them down. The white line is useful as it keeps you connected to your object and is essential if you are not to lose control of it. [Ctrl]-[5] is a particularly useful keystroke as it stops all movement while you take a breather, and [Ctrl]-[Delete] will remove your objects if you decide that they are not to your taste. We strongly recommend printing out the Editor Commands pages from the manual during the process of construction – it will save many tears before bedtime.

The fun starts once you realise how powerful and flexible this little program is. Can you put a large skyscraper on top of Mt. Everest? In theory, yes, but it's easier to find a flat surface first on which to practise. We tried embellishing a remote American farm strip with buildings and aircraft and it worked a treat. Afterwards we added a substantial fleet of light aircraft to one of our favourite airfields and a number of human figures to bring it to life. Naturally we couldn't resist a trip down to the Antarctic to plonk a huge municipal building on a deserted stretch of ice! Our next project was to build a small village in New Zealand's South Island; It's actually a hamlet called



New Zealand looking particularly sparse



Ruatapu back on the map

Ruatapu, which really exists, but the FS2002 programmers don't seem to be aware of it. In just a few minutes we had restored it, and a neat line of houses are now in place at the correct latitude and longitude.

Any scenery you create can be circulated amongst other enthusiasts who have a registered copy of FSSE, and once you get a taste for improving your simulated world in this way, it's likely to become very habit-forming. Registered owners can also take advantage of a new service pack available from the Lago website (or on the cover CD). It contains 61 extra objects, including birds, more aircraft, and a host of more complex airfield vehicles; extras such as a swimming pool, castle, and various strips of grass and tarmac should help you find a more authentic match for your own local features.

Christopher Jarman



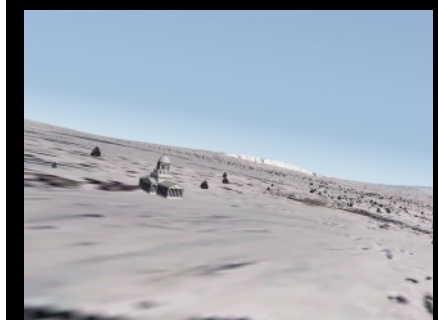
Club aircraft at Old Sarum...



...and after a population explosion



The development of Antarctica begins



Ozymandias' ambitions pale in comparison!

Review Score

Publisher: Lago

Price: £16.00 approx. (shareware download)

Website: www.lagoonline.com

Developer: Vistamare Software

At a glance: Put what you want where you want it. An expansion in the truest sense of the word.

System Requirements: PIII 450MHz, 64Mb RAM, 16Mb graphics card

Recommended: PIII or Athlon 1GHz+, 256Mb RAM, 64Mb 3D graphics card

Using the Flight Management Computer



Keeping on track with the FMC

One of the most recent aircraft systems to appear in flight simulation is the FMC, or Flight Management Computer. These are now the mainstay of all modern airliners and are incredibly competent devices once you know how to use them. Therein lies the catch, however; as developments bring simulators closer to the

real thing, your level of competence as a PC pilot has to increase correspondingly. It's somewhat ironic that, as the sophistication of flight simulators has increased by leaps and bounds, the length of the manuals supplied to accompany them has decreased at just as fast a pace, with only a couple of exceptions.



The LEGS page, where you will do all your route editing

Fortunately, as with many things in modern aviation, the designers of FMCs make them as simple to operate as they can, so that they become an aid to the pilot rather than a burden. The big advantage of this, for those of us flying the simulated versions, is that you can get the main benefits of the FMC with only a few basic techniques. Even better, by the end of this article, you will hopefully know what these techniques are. Because we are dealing with a simulation of a real piece of equipment, what is written here should be applicable to simulations of most aircraft using the Honeywell FMC, such as the Boeing 747, 757, 767, and 777.

The best way to learn about any system is to use it, so we'll take a demonstration flight using the FMC, in order to show how it can be used to make a taxing flight far less demanding. The use of this modern technology is one of the factors that have enabled major airliners to fly safely with a flight crew of only two. Your challenge is to go one better and fly with a crew of only one. Wilco's 767 Pilot In Command is used in the example below, because it is both very competent and very popular, and there are only slight variations between this model of FMC and those used in other modern Boeing airliners.

Preliminary basics

The part of the FMC that you will deal with is called the CDU (Control Display Unit), which comprises a keypad and a display screen. The display screen is split into two sides; data will be displayed either on the left or right hand side of the screen. The screen is also split into a larger top data area, which shows the data held in the FMC, and a bottom input area. The smaller part at the very bottom of the screen, usually under a dashed line, is called the scratchpad and is used for data entry. Anything you type on the keypad will appear in the scratchpad, as will most messages, such as fault conditions, that the FMC sends to you.

On both sides of the screen are six buttons called the LSKs (Line Select Keys), and they are referred to by a number and a letter, such as 5R. The letter is L or R, meaning left or right of the screen. The numbering is based on the key's vertical position. The top key is number one and the bottom key is number six, hence LSK 5R (or Line 5R) is the fifth button down on the right hand side.

When you have typed something into the scratchpad, it can be moved into position on the top part of the screen by pressing the Line Select Key next to the place where you want the data to appear. In many cases you can also do the opposite and press the LSK next to some data to copy it to the scratchpad. Some LSKs will be used for links to other pages; if you see ROUTE>, for example, then pressing the LSK next to this will take you to the ROUTE pages.

When you programme the FMC, anywhere that data can be entered (via the scratchpad and LSK of course) is marked by either dashes or boxes. Dashes indicate that the input of data is optional, whereas the boxes specify that data entry is mandatory. The FMC will normally refuse to accept your planned flight unless you enter data into all these crucial boxes.

Terminology

AFDS – Autopilot Flight Director System

CDU – Control Display Unit

EADI – Electronic Attitude Director Indicator

EHSI – Electronic Horizontal Situation Indicator

FL CH – Flight Level Change

FMC – Flight Management Computer

INT CRS – Intercept Course

LNAV – Lateral Navigation

LSK – Line Select Key

T/C – Top of Climb

T/D – Top of Descent

TMC – Thrust Management Computer

VNAV – Vertical Navigation

Deletion of data can cause problems for pilots who are new to the FMC, but the basic procedure is easy enough. To delete something from the scratchpad, simply press the space key on the CDU, or repeatedly press the [CLR] key if you want the exercise. To delete data from the main screen, press the [DEL] key and the word DELETE will appear in the scratchpad; then press the LSK next to the data you wish to delete. This is where you are most likely to have difficulty and find the words INVALID DELETE appearing in the scratchpad. The catch is that you cannot delete items from the ROUTE pages; you must delete them from the LEGS pages.

When you delete a waypoint from a route on the LEGS pages, the FMC will create a DISCO, or discontinuity. This is because the FMC does not know what you want to do between the waypoint before the one you have just deleted and the one after it. It could probably guess, but it might be wrong, so it shows a discontinuity to force you to input your exact intentions. To remove a discontinuity, you must go to the LEGS pages, and then enter the name of a waypoint that comes after the discontinuity into the boxes just before the discontinuity. The best way to do this is to press the LSK next to the waypoint after the discontinuity, which will copy it to the scratchpad, and then press the LSK adjacent to the boxes that are just above the discontinuity. The waypoint will be copied from the scratchpad and the discontinuity will be cleared.

Example flight from Glasgow to Heathrow

The starting point for any IFR flight is a flight plan, and studying the SIDs (Standard Instrument Departures), airways, STARs (Standard Terminal Arrival Routes) and approach plates, the following seems a sensible route:

EGPF DCS7B DCS A1 HON BNN1A EGLL

To translate this into English, the route departs from Glasgow on the Dean Cross Seven Bravo SID to Dean Cross VOR, via airway A1 to the Honiley VOR, and from there along the Bovingdon One Alpha STAR to Heathrow. We will take off from Glasgow's runway 05 and land on Heathrow's runway 09L using the CAT II ILS DME approach.

We'll assume that you have completed all the other preparations, and get straight into programming the FMC. The engineers who developed the FMC recognised that the same things would need to be done before almost every flight, so they simplified this process by making many of the necessary pre-flight pages appear in the order that you will need them. When you complete one pre-flight page, the next logical one is offered via a link. All you have to do is to press the relevant LSK. You'll see how this works as we programme this flight.



Press LSK 2R on the CDU to move 104 into the mandatory Cost Index boxes

Where a screen only shows one of a series of pages, the top right of the display will show both the current page number and the number of pages. If you are on page three out of five LEGS pages, for example, you will see 3/5 displayed. You can step through these pages by pressing the [NEXT PAGE] and [PREV PAGE] keys on the CDU keypad.

IDENT

You will need to navigate to the IDENT page. For this system, bring up the CDU by pressing [Shift]-[6], then press the LSK 1L next to the letters <FMC. The IDENT page shows some information about the plane and its engines. There is nothing to do on this page, but notice that LSK 6R has POS INIT> written next to it. This is the FMC guiding us through the pre-flight process, so press LSK 6R to go to the POS INIT page.

POS INIT

There is very little for us to do on the POS INIT page. Simply type EGPF into the scratchpad using the CDU keypad; this is the ICAO reference for Glasgow. Next press LSK 2L to move EGPF from the scratchpad into the REF AIRPORT field and the job is done. Press LSK 6R to move to the next page, which is the ROUTE page. Now you can see the pattern developing; when you have entered sufficient pre-flight data on each page, the option to move to the next screen appears at LSK 6R.

ROUTE

The fun begins when you start to enter the route. If your FMC has the correct SIDs, STARs and airways, the route will be relatively straightforward to enter, but unfortunately your database is unlikely to include these for this route in the UK. This means that you have to programme the FMC the hard way, which is still relatively straightforward.

Two routes can be held in the FMC at any one time, although only one of them can be active. You could work with either, although most people prefer to use RTE 1 for the main route and RTE 2 for diversions. You can switch between the two routes using an LSK, normally LSK 6L.

On the ROUTE page you'll see several sets of boxes and dashes signifying where you need to enter the data. Remember that the boxes are for mandatory input and the dashes are optional, but follow the guidance here until you are more familiar with FMC operation. You should input:

ORIGIN – Departure Airport – enter EGPF and press LSK 1L.

RUNWAY – Departure Runway – enter 05 and press LSK 2L.

DEST – Destination Airport – enter EGLL and press LSK 1R.

FLT NO – Flight Number – anything you wish; it's optional, so PCP001 will do nicely. Press LSK 2R.

CO ROUTE – Company Route – leave this blank. Note that if you had previously saved a route or a plan from the FMC or the planner in FS2000, the filename could be entered here to recall it.

Having done this, the ROUTE page looks complete, but you have only finished the first page. Look at the top right of the CDU screen and you will see that this is the first of two pages that are available to hold the route. As you add waypoints, the number of



After you enter your flaps setting here, the V speeds are given on the right hand side



When you are past halfway, you can select the destination runway on the DEP/ARR pages

pages allocated for the route will increase automatically to provide space for you. Move to the second page by pressing the [NEXT PAGE] button on the CDU keypad.

The initial stage of the route is the SID and this will have to be entered as a number of waypoints. The first waypoint on the Dean Cross Seven Bravo SID is the GLG NDB, so

enter GLG into the scratchpad and press LSK 1R. The FMC will politely reply that this NDB is not in the database. You did everything correctly, but it is just not there. Clear the scratchpad by pressing the space key on the CDU twice. You still need this waypoint for the SID, so look at the SID plate and you will see that the location of the GLG is N55 55.5, W004 20.2. Carefully enter this onto the scratchpad exactly as N5555.5W00420.2 (with no spaces) and press LSK 1R; this time it will be accepted.

The next programmable point on the SID is 14 miles from the GOW VOR on the 157 degree radial. This can be programmed as the next waypoint by entering GOW157/14 into the scratchpad and pressing LSK 2R. If GOW were not unique in the world, however, the FMC would not know which one you wanted to use. When this happens it gives you a choice, and you should look at the co-ordinates and select the most logical one, which in this case would be near N55 W004. The next waypoint is on the same radial at 19 miles, so enter GOW157/19 and press LSK 3R. The end point of the SID is the Dean Cross VOR, so enter DCS and press LSK 4R. For easy reference when you are programming the SID, the entries are:

- N5555.5W00420.2 – LSK 1R
- GOW157/14 – LSK 2R
- GOW157/19 – LSK 3R
- DCS – LSK 4R

Now for the short airways section of the flight. You could simply enter Honiley as the next waypoint, but this would then miss out the intermediate fixes, which we want to include in the route this time. Entering them is relatively easy because the FMC knows the fixes by name, so use the same philosophy to enter the waypoints along A1:

- LAKEY – LSK 5R

When you do this the FMC offers two LAKEY waypoints, but only one is anywhere near our route (at N54 W002; compare this with the first waypoint just entered above). Select this one by pressing the adjacent LSK 1L. You will have to do this on several waypoints, but in each case the selection is obvious when you consider the latitude and longitude.

Now press [NEXT PAGE] to continue entering the route:

- CALDA – LSK 1R
- CROFT – LSK 2R

The next waypoint is BARTN, but do not enter this now; leave it out for the moment so that you can see how to add a waypoint that you missed.

- LOVEL – LSK 3R
- CONGA – LSK 4R
- HON – LSK 5R

You are now ready to program the Bovingdon One Alpha STAR, which will take you from Honiley to Bovingdon. You would normally do this on the DEPARTURE and ARRIVAL pages, but you will have to input the arrival point by point because the FMC holds no STARs for Heathrow. This is easy enough to do using the method already described, so add the following waypoints to your route. Remember to press the [NEXT PAGE] button to move to the next free slot when you reach the bottom of a page. The waypoints are:

- HON144/32 – bearing 144 from Honiley at 32 miles
- WCO – the Westcott NDB
- BNN – the Bovingdon VOR DME

The last part of the flight is the CAT II ILS DME 09L approach into Heathrow. This is not normally programmed yet, because you can never be sure which approach the controller will give you, so we will programme it later.

Now you have the route entered into the FMC you will need to activate it. The FMC will prompt you to do this at LSK 6R. Press this and the light in the [EXEC] key on the CDU will illuminate. Although you have activated the flight, it will not become genuinely active until you press the [EXEC] key. Press it and three things happen. Firstly, the [EXEC] light goes out; secondly, the indication at LSK 6R changes to offer the link to the next stage, PERF INIT; thirdly, the route shown on the EHSI changes from a dashed white line to a solid magenta one.

PERF INIT

Performance Initialisation is pretty straightforward, and the only data you need to add is the following:

ZFW – Zero Fuel Weight. For 767 Pilot in Command this is always entered as 111.1, which is 111,100 kg. If you are working in imperial units enter 245, which is 245,000 lbs. Note that the gross weight is automatically calculated for you.

RESERVES – This should really be a calculated figure, based on your time for diversions and holding. Entering a figure of 10 (tonnes) is not unreasonable.

CRZ ALT – Cruise Altitude. For this short hop, which is mostly SID and STAR, you

cannot establish a great height, so enter 25,000 feet here. You can enter heights as 25000, FL250 or 250; the FMC assumes it knows what you want, and even gets it right most of the time.

COST INDEX – This is a factor that is used by the FMC to determine how much money you are prepared to spend on fuel to shorten the duration of the journey. A higher number means that you are prepared



Every piece of information on here is useful; get to know what they all mean



For most of the flight your AFDS will be set like this with LNAV, VNAV and one autopilot selected

to spend more on fuel to reach your destination faster. For a maximum weight Boeing 767-300 cruising at Mach 0.80 and 29,000 feet, this would be 80. Increase the speed to Mach 0.84 and the cost index increases to 800. You will fly at Mach 0.8 and FL250 so the correct figure is 104.

When the above data is in place, all the other figures will either be completed automatically by the FMC or should be left blank.

You are now ready to click on LSK 6R and move onto the TAKEOFF page.

TAKEOFF

The TAKEOFF page is even simpler. All you need to do here is enter the flap setting you are going to use for takeoff. Enter 15 at LSK 1L. Look at the V speeds and you will see that the first three are set to V1, VR and V2. Do not press the invisible switches on the ASI or the speed bugs will move.

Again the FMC continues to guide you, but this time it simply indicates at LSK 6R that you have completed the pre-flight programming. If it does not show COMPLETE, you have missed something, so go back to the beginning and check that there are no mandatory input boxes that you have missed along the way.

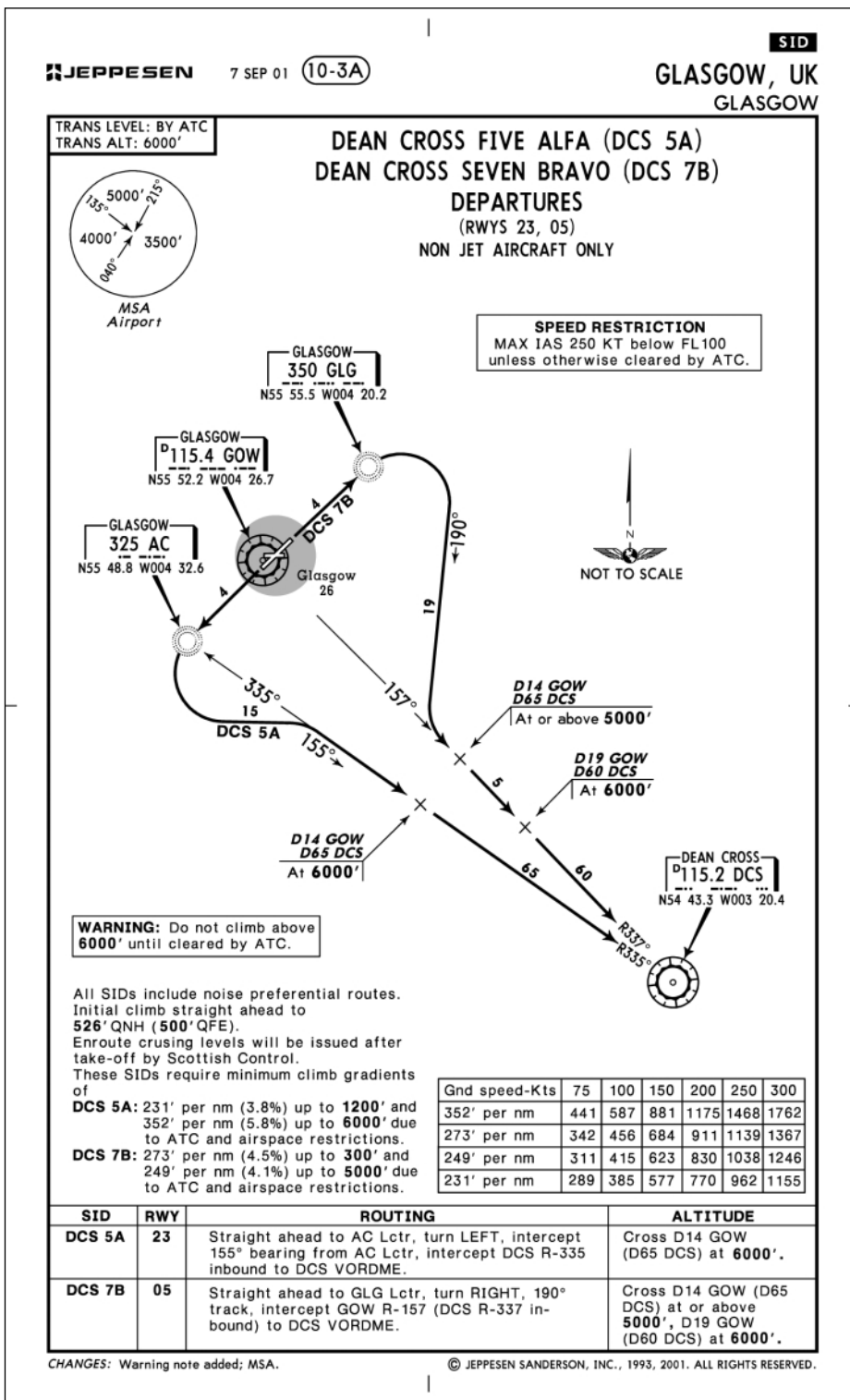
Checking the route

Before you fly, it is always sensible to carry out a quick check that the route at least looks about right. A route that takes you to London in Canada, instead of London in England, should be easy to spot. To do this quick reality check, press the [LEGS] button on the FMC and then turn the EHSI (Electronic Horizontal Situation Indicator) to its plan mode. There are two rotary switches to the right of the EHSI; the left hand one is for the scale used on the EHSI and the right hand one is the EHSI display mode. When the EHSI is in plan mode, you can use the STEP prompt at LSK 6R to step through the flight, one waypoint at a time.

Hopefully this looks right, but you will remember that we deliberately left out BARTN so that we could put it in later. Now is the time to add it; the intuitive thing to do is to go to the ROUTE pages, key BARTN into the scratchpad, and then press the LSK next to LOVEL, to insert BARTN there. The FMC will object to this, giving the message INVALID ENTRY. This does not work, so clear the scratchpad by pressing the space key on the CDU.

The trick here is to remember that *initial route creation should always be done on the ROUTE pages, and route editing should always be done*

on the LEGS pages. Remember this because otherwise you are likely to get very frustrated at some point in the future. If you are not already on the LEGS page, press the [LEGS] key on the CDU keyboard. Search with the [NEXT PAGE] and [PREV PAGE] buttons to find LOVEL. Next type BARTN into the CDU scratchpad again and press the LSK next to LOVEL on the CDU. Like magic, BARTN appears where LOVEL was, but a discontinuity appears between BARTN and LOVEL. As mentioned in the preliminary basics, to remove the discontinuity press the LSK next to LOVEL (LSK 5L). LOVEL now appears in the scratchpad, so copy it into the boxes just



The Standard Instrument Departure Dean Cross Seven Bravo from Glasgow

below BARTN by pressing the LSK 4L, which is next to them. The discontinuity should now have disappeared.

The final stage is to add some critical heights for the individual waypoints. You should let the FMC work out most of them, but there are a few restrictions. Looking at the SID, the third point in the procedure should be crossed at 6,000 feet. Find this point, named GOW02 by the FMC, on the LEGS pages. Enter 6000 into the scratchpad and press the right hand LSK next to this waypoint. Use the same

procedure to set the height for Honiley (HON) to FL140, and Bovingdon to 7000. You could also put FL250 into all waypoints that are currently higher than this, but it is not necessary. As you have now changed the flight, the FMC insists that you confirm it. It turns on the light in the [EXEC] button to remind you, so press the [EXEC] button and all the changes will be activated. When you have done this you should see both a top of climb (T/C) and a top of descent (T/D) shown on the route on the EHSI.

You are now ready for takeoff, so hide the CDU for a short while with [Shift]-[6].

The short but busy flight

For this flight you will have to start at the threshold of Glasgow runway 05 ready for takeoff. Here are a few absolutely essential items you need to check:

EHSI – Map mode and maximum magnification

Flight Director – ON

Autothrottle – ON/ARM

NAV 1 – AUTO

Auto-brakes – RTO

Flaps – 15

Controls full and free (to wake up any USB joysticks)

Autopilot altitude – 6000

Autopilot heading – 053

TMC TO/GA

This last one tells the Thrust Management Computer that it should control your throttles in the Take Off and Go Around mode. The altitude setting may also seem a little strange, but this is the first limit you have and, as the initial part of the flight will be done without VNAV, it is sensible to set this limit to prevent 'busting' your level.

Prepare to be very busy over the next few minutes because there is a lot to do in a very short space of time. Push the throttles fully forward and carry out a normal takeoff, rotating at VR (about 160 knots), which should still be the second bug. As soon as you are climbing steadily, retract your undercarriage and shortly afterwards click one autopilot on. The autopilot will then hold your heading and rate of climb.

You will see that the FMC's route has cut the corner instead of flying over the first waypoint. In fact the initial part of the route is not particularly accurate, so you will have to control the plane yourself using the AFDS (Autopilot Flight Director System), which is the eyebrow panel at the top of the main panel. It is also called the MCP (Master Control Panel). Start by adjusting the autopilot heading until it is over the first waypoint, and then press the [SEL] button/knob just below it. The plane should quickly settle onto this heading, so press the heading [HOLD] button and reset the heading to 190, which will be your next heading. Because the autopilot is in heading hold mode, it will stay on course to fly over that first waypoint. Next press the autopilot [FL CH] button, which is the flight level change button, and engage the

autopilot speed at 180 knots. By now you will be approaching the first waypoint. As soon as you reach it, press the heading [SEL] button and the plane will turn onto the heading 190 that you have already placed into the AFDS. When the turn is completed, set the autopilot speed to 250 and retract the flaps one stage at a time as the plane accelerates.

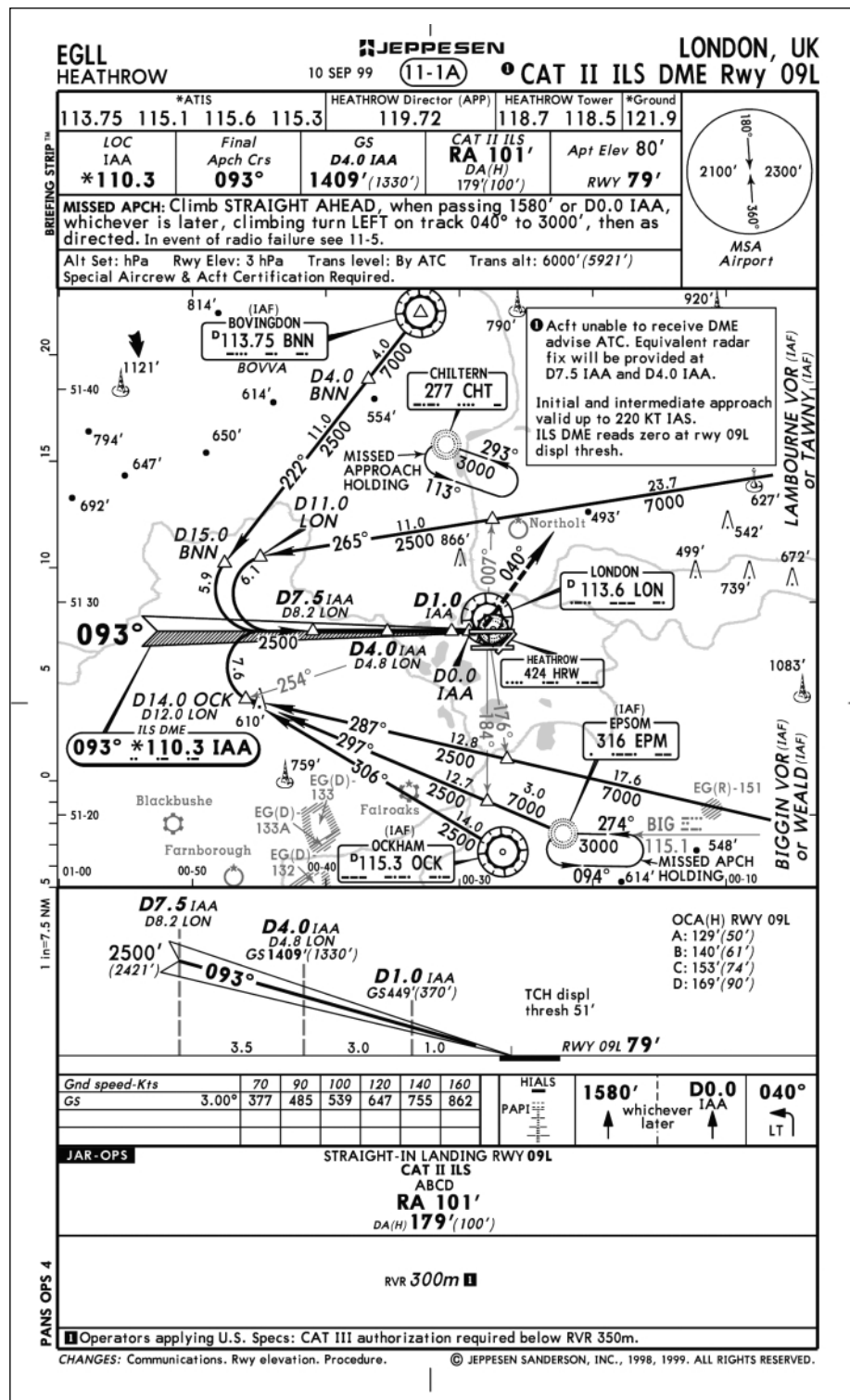
The next trick is to automatically intercept a radial to a waypoint using the FMC. The first step is to re-initialise GOW01 as the next waypoint. To do this, move to the LEGS pages and click on the LSK 1L next to GOW01; this transfers GOW01 to the scratchpad, and now click on LSK 1L again. This not only makes the waypoint in the scratchpad the next waypoint, but it also allows the input of an intercept course (INT CRS) at LSK 6R. The radial we want is 157, so enter this into the scratchpad and press LSK 6R. Press the [EXEC] button to activate the change you have just made to the FMC plan. Finally press the [LNAV] button on the autopilot, and the FMC Lateral NAVigation will now fly you to Bovingdon. If you were a little late with your initial turn, if the wind is working against you, or if your airspeed is too fast in the turn, your intercept may be after the waypoint and the FMC will object with the message NOT ON INTERCEPT HEADING. If it does, clear the error message with the space key on the CDU and repeat the intercept process, but without adding the 157 intercept course. This will fly you directly to GOW01.

After you have passed the GOW02 waypoint, you receive clearance to your cruising flight level at 25,000 feet. Set the autopilot altitude to 25,000, or any number greater than this, and then press [VNAV]. The Vertical NAVigation now takes over. If you had set 21,000 feet in the ADFS, the autopilot would change back from VNAV to altitude hold when you got there. This allows you to manage ATC clearances without having to re-programme the FMC every time.

Cruising

When you have passed BARTN, pressing the DEP/ARR button on the CDU will allow you to select the approach details. Select 09L as this is our destination runway. You cannot do this much earlier, because the FMC would assume that you wanted to return and land at Glasgow. Now move to the LEGS pages and add a couple of waypoints and their heights to guide you down to final approach. Use the methods already described, although you should add the speed limit in front of the altitude this time. These are from the CAT II ILS DME Rwy 09L approach plate and are:

- Waypoint at BNN222/4 with speed and altitude at 200/7000
- Waypoint at BNN222/15 with speed and altitude at 180/2500

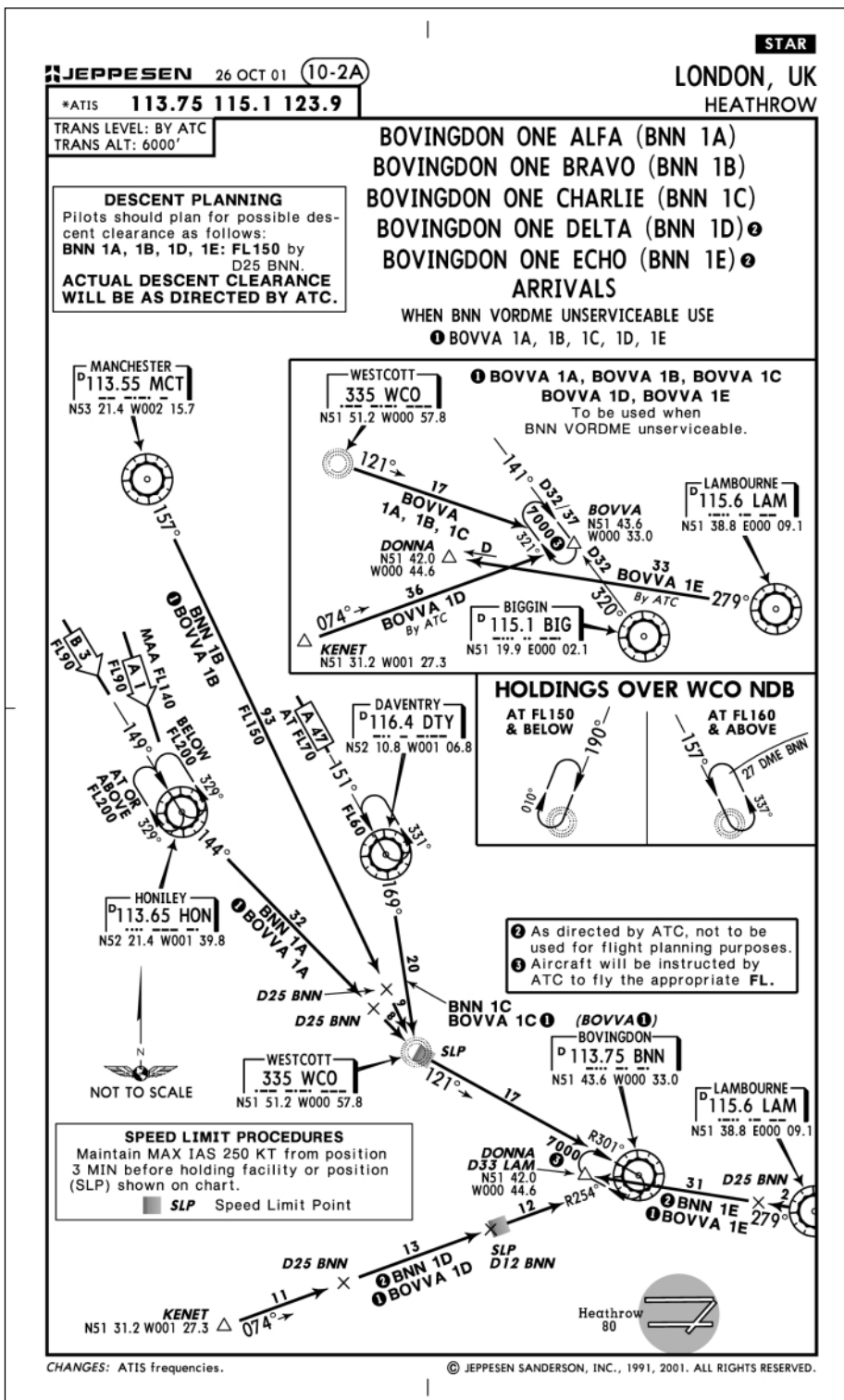


CAT II ILS DME approach to Runway 09L at Heathrow

These waypoints should now be inserted between BNN and RWY09L. If you examine the ILS plate, you will see that these both lie on the 222 radial from Bovingdon, with the first, four miles from the beacon, shown as D4.0 BNN, and the second 15 miles past it, shown as D15.0 BNN. Looking at the legs between all these points will also show why 7,000 feet and 2,500 feet were chosen as altitudes.

Once you have reached your cruising altitude, the AFDS will either be in altitude hold or VNAV mode. As you approach the

T/D (Top of Descent) point, you are initially cleared to FL200, so set 20,000 in the AFDS altitude window and check that [VNAV] is lit; if not, press it to light it up. Now as you pass the T/D the plane will automatically reduce power and enter the descend, but as it reaches FL200, it enters altitude hold mode. Shortly afterwards, you are cleared to descend to FL140, so set the AFDS to FL140 and press [VNAV]. At Honiley you enter the STAR and are instructed to descend to 7,000 feet, so set this in the AFDS altitude window and again ensure that [VNAV] is illuminated.



The Bovingdon One Alpha STAR to Heathrow

Everything should now run smoothly until you reach Bovingdon. Unfortunately you were unable to programme the approach into the FMC, so you will have to handle this using the standard autopilot functions. It's as well to start this before you reach Bovingdon, because the FMC has difficulty with the large heading changes over the short distances.

As you are approaching Bovingdon, reduce your speed to about 200 knots, lowering 5 degrees of flap; this will make sure that your turn radius is not too big, and give you

a little more time on the 15-mile leg closing onto the localizer. A short while before you reach Bovingdon, select heading hold and altitude hold, then input 222 into the heading window on the AFDS. This will not affect your actual heading at the moment because you are flying in heading hold mode and not heading select mode. When you are about to fly over Bovingdon, press the heading select knob below the heading window, and the autopilot will turn you onto heading 222. If you are lucky, this will fly you directly onto the track line on the EHSI, but the chances are that you will

have to make some small adjustments via the heading select window in order to put you back on track.

You should also dial 2,500 into the altitude window on the AFDS, and again nothing will happen because you are in altitude hold mode. When you are past BNN01 you can descend to 2,500, so press the [FL CH] (Flight Level Change) button. You should now be heading directly for BNN02, which you programmed in at DME 15 on the 222 radial from the BNN VOR. Lower the flaps further to 15 degrees and reduce the speed via the autopilot to 180 knots. Click on the lower left of the ASI to set the speed bugs for landing. Heathrow has a rather long runway, and you should manage with only a small amount of auto-braking, so set this to 2. Also confirm that the VOR 1 is still set to AUTO.

Autoland

You should now be predicting that when you reach BNN02, you will need to turn onto a heading from which the autopilot can capture the localizer. The localizer heading is 093, and we will opt for a 30 degree closing angle. The procedure for this should now be familiar. Press the heading [HOLD] button and set 123 degrees in the heading window in the AFDS. When you eventually do pass the BNN02 waypoint, press the heading select knob and the plane will turn onto heading. As soon as the plane is stable on the new heading, press the [LOC] button on the AFDS; the autopilot will now hold the heading until it captures the localizer, at which point it will drop out of heading hold mode. As soon as you have captured the localizer, press the [APP] button on the AFDS. In a similar way as before, the autopilot will hold your altitude until it reaches the glide slope.

Lower flaps to 20 degrees. Now you must monitor the glide slope indicator on the right hand side of the EADI. As soon as the indicator moves, lower your undercarriage and select 25 degrees of flap. When the indicator reaches the glide slope line, select flaps 30 and set the approach speed, which should be the slowest speed bugged on the ASI at about 165 knots. Also set the spoilers to automatically deploy on landing. Once the plane has settled onto the glide slope, prime the autoland by pressing the other two autopilot select buttons on the AFDS. Now, despite all this modern technology, there are many reasons why you may not actually land, such as a blocked runway, failure of the autoland system and so on, so it is wise to plan for this. Now is the time to set the AFDS one last time before landing. Set the heading window to 093 and the altitude window to 3,000 feet. Hopefully you will not have to use these, but if the approach fails, aborting is much easier if you only have to press a button or two.



It's OK - there are two FMCs but you only need to use one of them!

As you pass about 1,500 feet, you should see the LAND 3 indicator, to confirm that all three autopilots are happy to continue and land. Finally, double-check that your undercarriage is indicating ‘three greens’; this final check has saved many a red face. As you touch down, be sure to remember that now you have to start controlling the plane; you have to apply reverse thrust and keep the aeroplane straight on the runway. In theory the autopilot should do this for you, but it is not as reliable as it could be, and it would be a shame to spoil a perfect flight with a lousy roll-out. It is also sensible to cut out the autopilot on touchdown, so that you know that you are the only thing controlling the plane.

Going transatlantic

Flying across the Atlantic is not significantly different to the flight described above, and certainly contains no additional elements as far as programming the FMC is concerned. You would try to cruise as high as possible, to reduce fuel burn and hence cost, and you would have to programme the various latitude and longitude points across the Atlantic. A suitable flight plan from Heathrow to JF Kennedy, New York, would be:

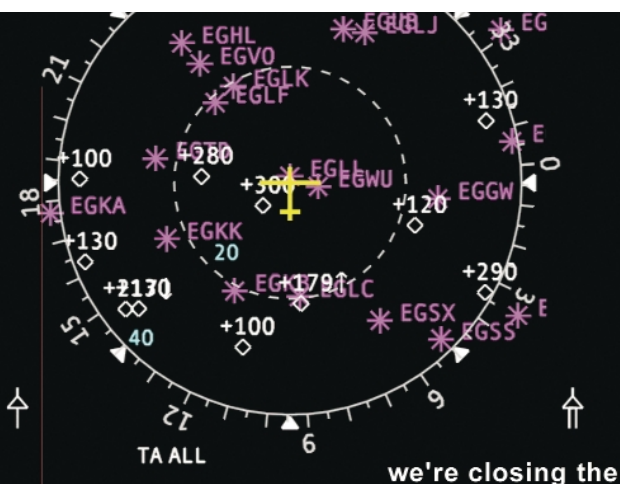
EGLL WOD CPT UG1 SHA UN535 53/15
53/20 53/30 52/40 50/50 YQX DAYSE YQY
BOS J55 PVD J225 JFK KJFK

The latitude and longitude such as 53/15 is North 53 degrees West 15 degrees, and would be entered as a waypoint as

N53W015, an abbreviated version of the previous method.

In many ways you will find the Atlantic crossing easier than flying locally around Europe or in the UK. The transatlantic flight comprises mostly long straight legs with minor heading changes at the waypoints every half hour. There is plenty of time to get on with other things while the FMC is managing the flight for you. Flying in Europe, however, is a completely different matter; the flights are generally short and there will always be something to keep you busy. Whichever your passion, the FMC is certainly the mainstay of all modern airliner flying, and therefore getting to know how it works is well worth the effort. ■

Stephen Heyworth



gap

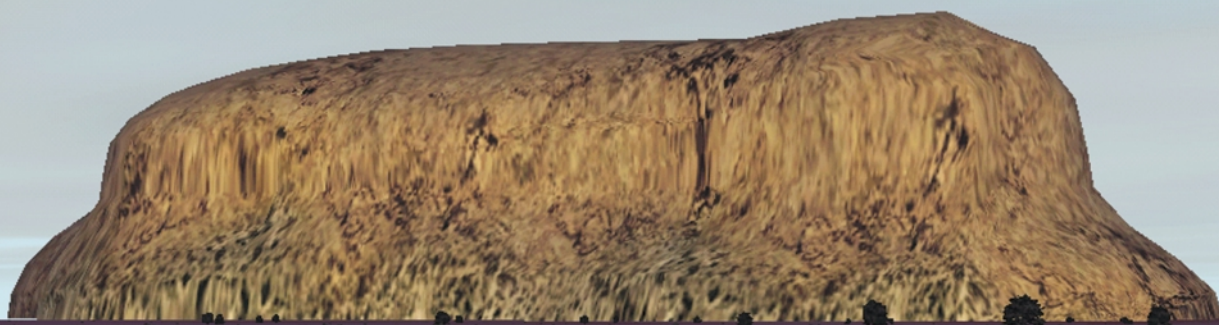
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FS2002

AS A 3D WORLD ATLAS



Ayers Rock – 1,110 ft. high, and 6 miles around

***"A plane may be just a machine, but what an analytical instrument it is!
It has revealed to us the true face of the earth." (Antoine de Saint-Exupéry, 1939)***

Christopher Jarman has been looking at Flight Simulator 2002 as a geographical resource as well as a flight simulator. He's impressed, but still wants more...

I spent much of a happy childhood poring over a thin paperback atlas of the world; inside the yellow cardboard cover the British Empire was coloured pink, and there was a lot of it too in those far-off days. I am certain that this gave me a great love of maps and charts which, after eight years as an observer/navigator in the Fleet Air Arm, later became an obsession. Thus I now have a huge cartographic collection from the places my wife and I have visited over the last 40 years. We have salted away free Esso maps of New Zealand and 18th century Admiralty charts of the Mediterranean; there are US FAA sectionals of the Florida Everglades in the sideboard, and large-scale 2½inch Ordnance Survey maps of the Cornish coast in the car door pockets. Since becoming a flight sim enthusiast, I have looked forward excitedly to seeing for real the full charts and maps that we all use when flying VFR. To look down from an aircraft and see the land laid out before you matching the piece of paper on your lap is to experience a particular kind of satisfaction, all the more so when the land does actually correspond with the area of a chart on which you have drawn your track. I have promised not to mention the Managing Editor's accidental mistaking of the Bristol Channel for Dartmouth when flying around Devon by microlight!

Good navigation is in itself a game well played when it works out properly, but so far most of the civil aviation simulators have been disappointing in their provision of detailed maps and charts; moving vector maps and GPS systems are no substitute for proper charts. While the excellent FS Navigator, which has been available since FS98, is better than anything that Microsoft has produced, it shows very few geographical features and in any case is not claimed to be a map, but rather just a good navigational aid. When Fly! appeared we were looking forward to its maps, but they turned out to cover only a few American states. X-plane is having a reasonable attempt at chart provision, but I suspect that there may be some serious copyright issues to deal with in this area.

I'm not, however, just complaining about the shortcomings of FS2002 by any means, and Microsoft's new release is a remarkable

achievement; visually it is a huge advance on previous editions, so much so that it has become for me a kind of 3D world atlas. It is enormously satisfying to slew oneself about the world admiring the scenery, and it's this that has prompted me to view it not only as a flying program but also as an extra geographical resource of a kind we have not seen before. I'd like to suggest some more exciting possibilities in scenery and terrain development for the future.

It is now possible to choose a photograph of a geographical feature from the real world – Mount Rushmore in the States, for example – and fly an aircraft to that precise part of the simulated world in FS2002, and match the photograph with the view on your computer screen. I have even flown the Cessna 172 to Italy and found the exact piece of coast at Ravello, in the Bay of Naples, where we have holidayed for the last five years. The screenshot is almost as good as the photo in our album taken last July. You can currently buy so-called interactive atlases on CD that are nowhere near as good as this. The only problem is that you need a large high-quality atlas in book form to help you find your way around. You might need a magnifying glass as well to read the names of small mountains or towns! A three-dimensional world really needs a detailed map to support it.

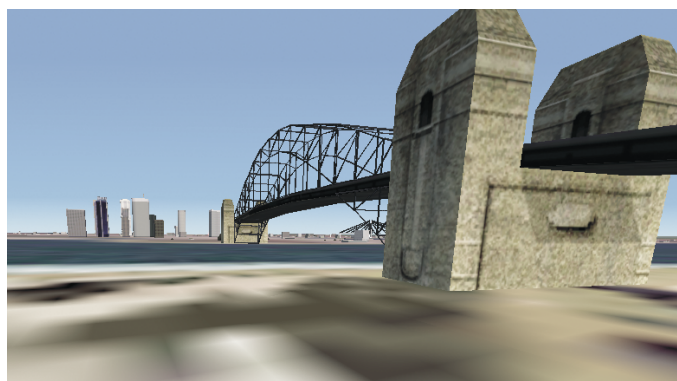
Using a high-quality world atlas, I have tried matching some geographical features that I have either photographed myself, or found in an encyclopaedia or travel brochure, with their renditions in FS2002. Take a look at Salcombe, for example; it's a pretty good match, as is Alderney in the Channel Islands; Miami is good too, and I was delighted to find Mount Hood in Oregon looking just like it does in a photograph. Microsoft often has its own Encarta World Atlas bundled with the software in new computers, so why can't they enable their own flight simulator to make use of it? Presumably in such a large organisation there is no interaction between the departments responsible for the programming of each product, but all it needs is a clever programmer to make the connection, and a small moving image of an aircraft could be superimposed on the Encarta map.

At the moment it's possible to click on the menu bar at World/Map to bring up the little map window provided with FS2002, which is the same as the one in FS2000. You can then type in any desired latitude and longitude. With my atlas at hand, I found the Ross Sea in the Antarctic and it was spectacular; I could never have anticipated the detail that I was presented with. If I had been whisked back in time to my years as an A-level student, I would have been as pleased as Punch, for nothing else could have brought home better the reality of that barren yet awesome part of our planet. How sensible it would be, though, if you could use the map visually and find in a trice the location you wish to visit; unfortunately the map in FS2002 doesn't even show rivers or mountains, and is so inadequate that it lets down a program that deserves much better.

With the Encarta World Atlas on a laptop beside the main screen, Ayers Rock in Northern Australia and the Ngorongoro crater in Tanganyika can be easily located with a simple latitude and longitude reading and the use of FS Navigator; this is exciting stuff! Unfortunately not all the world features on the 3D terrain are as accurate as they might be and some are not even present. Gibraltar is depicted as a feeble hill, and its poor representation would certainly irritate me if I lived in that part of the Mediterranean. Venice too is extremely disappointing, and is not only lacking in canals but also not even represented as urban. Naturally enough, the grandeur of their very own Grand Canyon hasn't escaped the notice of the American programmers but they might have remembered that some rather dramatic scenery does exist in other parts of the globe.

Notwithstanding these unsatisfactory representations, just taking a look at the comparisons between actual places and how some of them appear in the simulated world should excite the wonder of anyone who enjoys travelling. Considering that this scenery is designed principally to support simulated VFR flying, it's an incredible triumph.

Until recently the majority of detailed scenery add-ons available through the Internet have been of airfields. This is understandable, as we know that the majority of FS users like to fly heavies, or to



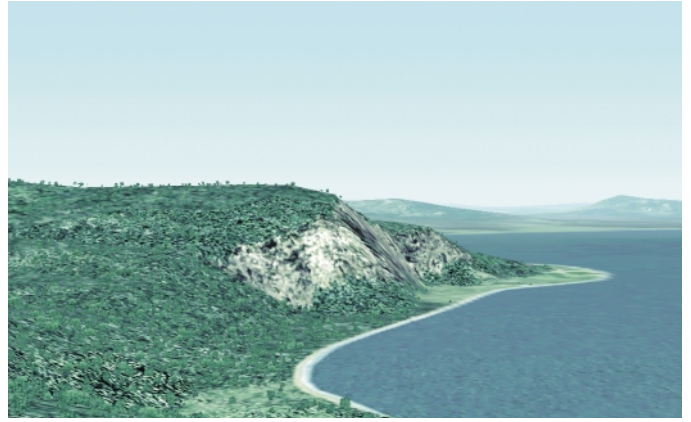
Sydney Harbour Bridge in FS2002



The Bridge itself – Paul Hogan not pictured



View of Ravello from Chris's holiday hotel



A recognisable simulated version



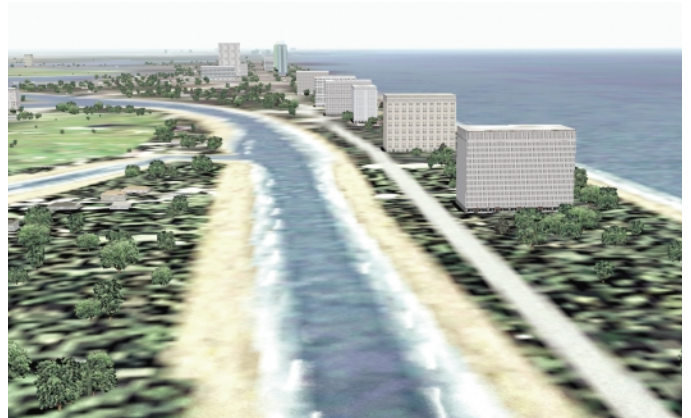
Mount Hood Volcano in Oregon...



...and an excellent version from Microsoft



Miami Beach - very familiar to British tourists



FS2002 Miami - more trees, less buildings



The real Mount Hawkins, discovered in 1999



Good to see it included in FS2002

join virtual airlines, and fly regular routes across the world; real airline pilots, of course, see very little scenery from 35,000 feet and are mostly familiar with major airports and their surroundings. But now that the facilities actually exist to design your own home town and its environs with the pinpoint accuracy of an F-16 gunsight, I sincerely hope this will be done more often, and hope too that Microsoft will encourage enthusiasts in the wider community to create their own scenery for Microsoft's simulation.

Many virtual flyers enjoy travelling around the world and visiting famous sites in small aircraft, and it's certainly fun to go and look, for example, at the place to which your brother emigrated ten years ago. Likewise it could be instructive to check out your next holiday destination. In my case I wanted to relive a recent sailing holiday in the Ionian Islands by flying over our old routes in the Cessna Caravan; it was very nostalgic and far more like the real experience than I could have ever imagined but, as my old headmaster used to say, 'Much wants more'; I'd now love to see the actual villages and harbours we visited, not just the mountains and lakes. Lago's scenery enhancing program, reviewed elsewhere in this issue, should be a step in the right direction.

To have every building and feature in the world eventually modelled in Flight Simulator is obviously an enormous undertaking; surely the only possible way to achieve this would be to establish some standardised quality control and encourage legions of enthusiasts to design their own localities. An Australian enthusiast who lives near Ayers Rock can then recreate it in all its glory and forward it to Microsoft for inclusion in the next version of Flight Simulator! Perhaps then we can have a proper rock of Gibraltar designed by a resident with a penchant for programming, and possibly some animated rock apes and a bullfight in nearby La Linea?

Ideally, the scenery in the next edition will be so complex that it will have to be published on two or three discs (or one DVD). After that, the following version (FS2006?) could allow permanent access to a satellite mapping system and we can all fly around in a downloaded real world with genuine moving vehicles and people. You'd be able to hover above your own house then go outside and wave at yourself! I haven't any idea what military technology is available in this line at the moment, but it seems that whatever technology the Pentagon uses in their secret equipment today will appear on our home PCs some years later. In the meantime I'm flying off to Greenland to take a look at the mountain that my friend Chris Hawkins discovered a couple of years ago and named after his father. I hope it will show up as pink on the maps!

Christopher Jarman

X-Plane worldwide scenery

Just as we were going to press, an interesting e-mail arrived from Michel Verheughe concerning the forthcoming worldwide default scenery for X-Plane. Michel and X-Plane developer Austin Meyer are suggesting that X-Plane users take advantage of their local knowledge to refine details of the elevation of mountain peaks, and the shape of cliffs and coastlines, particularly where these features appear near airports. The plan is that these amendments (using only the default textures for the default scenery) can be uploaded to a regional server for a moderator to assess their suitability, and then from time to

time these files will be downloaded to Austin's server and used to produce future releases of the scenery.

There are also plans for users to submit what might best be described as 'monuments' – the Eiffel Tower, Golden Gate Bridge, and so on.

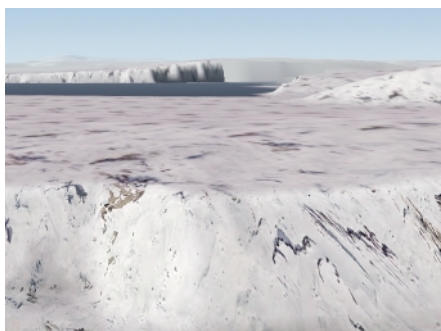
This sounds like an interesting project, and one which our author would no doubt applaud heartily. A website will soon be up and running with all the details of how to get involved, but in the meantime keep an eye on the X-Plane website (www.x-plane.com) for further news.



The three square miles of Alderney



Alderney in FS2002, complete with airfield



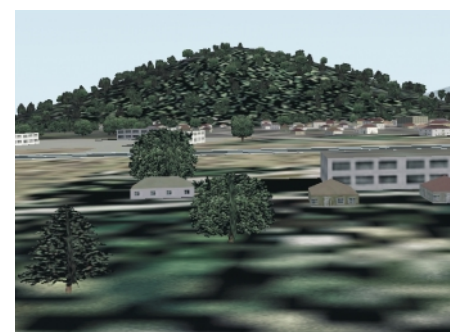
The Ross Sea ice shelf. As cold as it gets?



Impressive – Mount Rushmore floodlit in FS2002



Dire – Is this Venice, or an Essex estuary town?



Gibraltar – not enough rock for even one ape to sit on



Simulated Salcombe in Devon



The real resort town

STATESIDE Simulators

When PC Pilot was invited to try out three of their full-motion simulators, Brian Rubin wasted no time in packing his bags...

Three steps to heaven



DC-9



747-400

Minneapolis, Minnesota, is home to Northwest Airlines' world headquarters, and it was here that I spent some time in three of their twenty magnificent simulators – the Airbus A320, the Boeing 747-400, and the McDonnell-Douglas DC-9.

To begin with, Peter Jungmann, who set the wheels in motion for my visit, gave me a comprehensive tour of the entire training facility. It's comprised of dozens of classrooms, including a specialized room containing mock-ups of emergency doors and other equipment necessary to train pilots and flight attendants in emergency procedures. At the core of the centre are the twenty simulators (with a price tag of around \$15m apiece) covering each plane in Northwest's fleet. The training facility itself is open for twenty hours a day, and is in constant use.

Each simulator has several support rooms for briefings, tuition and so on. Prominent here are the encyclopaedic training and procedural manuals, each of which is comprised of thousands of pages and covers the detailed procedures essential for every pilot; flying aircraft this big is all about using the proper procedures – "creative thinking is not a necessary qualification for a pilot".

The same...but different

While the simulators obviously have their differences, they share many common features. Each one is a self-contained, full-motion simulator containing exactly the same controls as the actual planes they simulate; the cockpits are transplanted from the real aircraft, and each simulator receives its avionic data from a bank of computers. It's not only the aircraft controls that are exactly replicated, but also all the other internal features such as microphones and emergency equipment. They are all connected to a walkway by a drawbridge that detaches from the simulator on a command from the instructor inside.

The training computers, with which an instructor can change settings, environments, locations, and so on are located inside the simulators, along with a video camera; each flight is recorded and later shown to the participants, to gauge the psychology and behaviour of the flight crew in action, and to determine whether proper communication was maintained throughout the exercise. This type of study has proved to be extremely valuable, as studies have shown that uncommunicative flight crews are just as likely to cause accidents as any type of mechanical problem.

The simulators themselves are huge machines, weighing between eight and sixteen tons (8,165-14,969kg), and are supported on hydraulic stilts which raise the base about fifteen feet off the ground. These stilts each allow about eight to ten feet of movement, and each one uses between

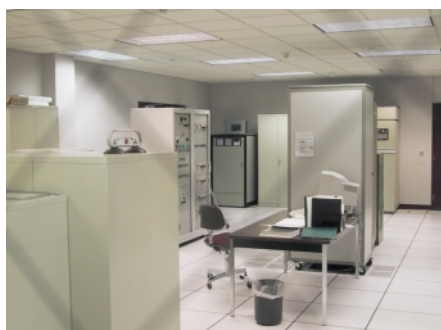
1,500-3,000 PSI of hydraulic force supplied by up to three 150-horsepower pumps. During take-off the simulators tilt upwards to provide the feel of the g-forces pushing against you as you accelerate down the runway, while the visuals inside remain level, cleverly convincing those inside that the plane is still level with the runway despite the actual orientation of the simulator.



Mock-up passenger cabin for emergency training



Learn first...then fly. One of the many classrooms



The heart of the beast – no laptops here

Visuals are supplied by several large projection screens placed in front of the cockpit window, and provide exactly the same field of view that a pilot would have when flying the real thing. The world in front of you is as expansive as it is detailed, and even the smallest things are given attention; while attempting a night landing at Los Angeles International Airport, for example, I noticed that there was traffic on the road below me. I was told that traffic lights, as well as other externally added visuals, can be added to the environment to gauge how easily a pilot might become distracted. The joy of being able to look to the right and actually see the airport without having to switch views was incredibly thrilling, and

definitely added to the feeling of immersion. Although the quality of the graphics varied from one simulator to another, the worlds created by the massive computers were staggering; traffic at each airport is fully modelled, and includes little polygonal men to direct you as you taxi to the gate.

The width of the field of view and the smoothness of the graphics are quite sufficient to trick the senses into believing that actual flight is taking place. Adding to this feeling is the audio, recorded from the actual planes themselves and recreated in the cockpit using a series of speakers. This lets you hear the movements of the landing gear behind you, the engines throttling up on either side, and the movement of the flaps.

An hour in each simulator didn't allow for any lengthy flights, but the capabilities of the simulators were demonstrated fully during several take-offs and landings, in a wide variety of conditions, and numerous airport fly-bys. Considering that much of a pilot's work during a normal flight is concentrated on the take-off and landing this seemed appropriate. If I had spent hours of time logging an actual flight it would only have given the autopilot much of the work to do.

Airbus A320

The first simulator on my list was the Airbus A320, a medium-sized aircraft which is one of the newest in Northwest's fleet, and which has become one of the most widely used aircraft in its class since its introduction in 1984. Having flown to Minneapolis on an A320 the previous day in the very same plane, and experienced my smoothest ever landing, I was keen to get to grips with this modern airliner.

It has a fully integrated glass cockpit, with all of the instrumentation displayed on multiple MFDs, and only a few gauges available for backup. There are also two FMCs, one for each pilot. Instead of the traditional two-handed yoke I was expecting, an F-16-style control stick was situated on the left-hand side of the pilot. A centrally located tray table took up the space of a traditional yoke, to allow the pilot to eat or glance at a manual while flying. The throttle quadrant was also smaller than I had expected, but the A320 does only have two engines. The six large MFDs provided, clearly and quickly, all the information any pilot could ask for, with each capable of displaying multiple screens of information such as waypoints, autopilot information, engine output, communications settings and so forth.

The A320 cockpit looks considerably more modern than those in the two simulators I was to fly later, and the A320 was certainly the easiest of the three to fly; multiple autopilot computers are almost capable of controlling the entire flight from take-off to landing. We actually experienced a computer-controlled landing, which was



A320 sim – Watch your step...and that nose wheel!

breathhtaking. These computers make the craft almost foolproof; they won't let you stall the plane, nor will they let you pull any erratic manoeuvres. If you attempt to stall the airplane, for example, the computers not only level the nose and wings, but also add extra thrust to keep the plane aloft. Since the plane is fly-by-wire, the computer can circumvent the flight controls when necessary, a feature not available in the 747-400 or DC-9. Actually 'flying' the A320 is simply marvellous – just feeling the simulator shudder under you as a result of turbulence, and experiencing the g-forces at take-off really do put PC simulations in perspective.

The A320 was also the simplest to control on the ground and was always responsive, whether controlled by the rudder pedals or the tiller, a small wheel beside the pilot for steering the nose wheel. I was unfortunately a little rough on the nose wheel during taxiing, resulting in the loss of "hundreds of dollars

worth of rubber." While it's by no means a small plane, it's fly-by-wire control system means that it's fairly manoeuvrable in most normal flight situations. The next plane, however, is a 'whale' (as it's affectionately called by airline employees) by comparison.

Boeing 747-400

Boeing's 747-400 is the latest in a hugely successful line of commercial airliners and, since its introduction in 1967, the gigantic 747 has been enormously popular with both airlines and passengers all over the world. This is because, according to Peter, Boeing's designers gave more consideration to passenger comfort than to ease of use and manoeuvrability from the pilot's point of view. Design obviously affects how the plane flies and, believe me, it's a finicky plane which flies like a greased pig.

The plane had to be kept on a certain angle upon take-off, and afterwards I was warned not to dip the nose too low or raise it too high. The throttle needed to be kept up, as going too slowly could have been equally disastrous. Flying and landing the 747-400 wasn't as easy as the A320, but the heightened challenge made it particularly enjoyable; it flies, just as one would expect, very heavily and sluggishly. The yoke moved quite stiffly, and the plane was slow to respond to pilot input. This required plenty of anticipation and a lot of thought while flying. The 747-400 also has the assistance of autopilots to help en route, but take-offs and landings are another story altogether.

The glass cockpit is laid out in a similar fashion to that of the A320, but with five MFDs and only one FMC in the middle panel; the control yoke is of the standard two-handed variety, and was also much stiffer than the somewhat loose A320 stick; then again, this plane isn't built for pretty manoeuvres. The autopilot is just as capable as that of the A320, and is probably used more often as a result of the 747's longer range. The 747-400 isn't a fly-by-wire aircraft and so, unlike in the A320, the autopilot won't try and compensate for erratic manoeuvring by the pilot.

One particularly disorientating aspect of the 747 is the location of the nose wheel; it's located about eight feet behind the cockpit, which takes a while to get used to. On the ground I initially experienced some problems in staying on the taxiway, but did improve after some practice. The heavier bulk of the 747 needed a lot more runway space than the A320, and steering it on the ground was again done by a tiller next to the pilot. Since the wheel was behind me, I was admittedly a bit hard on the poor wheels again, causing the whole simulator to shake violently.

McDonnell-Douglas DC-9

The final plane was the smallest and by far the most responsive of the three – the McDonnell-Douglas DC-9. In spite of being one of the oldest planes in Northwest's fleet, it's still widely flown today. One interesting feature is its ability to engage reverse thrust and back away from the gate without the use of a ground vehicle. It's small, in

So where can I try one for size?

BCC GUMP/KFIS

As you'd expect, an experience like this doesn't come cheap and for \$500 (about £360) you get an hour in the Northwest Airlines simulator with KFIS (a company that trains pilots on these machines), plus a facility tour and time to take photos. However, you can split the cost with a couple of friends and it'll give you something to talk about for many months. If you're stateside you can contact KFIS at www.2beapilot.com or BCC Gump (who arrange days out at the facility) at bccgump@aol.com. Remember, KFIS is a proper flying school, and they can train you to be an airline pilot if that's what you want. In light of recent events security is tight and Peter tells us that the FBI have access to the records of all companies engaged in flying-related activities in the US.

Meanwhile, over on this side of the pond, despite the best efforts of the gutter press in the form of the Daily Excess to get flight simulation banned by the government, it is also possible to have an experience like Brian's.

VIRTUAL AVIATION

Experts in the field of organising days out in flight simulators, VirtualAviation can offer flights in a huge range of simulators and their market is anyone looking for a fun day out. However, they

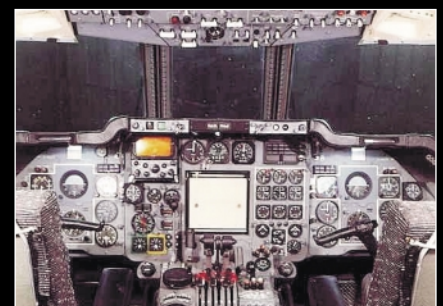
also offer simulator sessions to help people overcome their fear of flying. Flights are available in a variety of aircraft at Heathrow and Gatwick and a typical price is £1,100 for a two-hour session for four people, although special offers are often available. Take a look at www.virtualaviation.co.uk and see what they've got to offer.

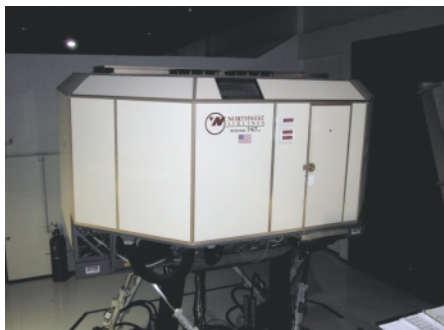


VINTAGE SIMS

Simulators have been around for quite some time and one company specialises in flights that take you 'up' in some of our airline heritage. As well as a DC-9, Classic Flight (www.classicflight.co.uk) can offer trips in a Trident 3 to anyone who wants to fly a 'proper' airliner (with gauges and big levers). Their Director, Chris Deagan, told us:

"As well as offering the experience of flying a 'real' jet airliner, Classic Flight also actively promotes both real flying and simming, bringing both together into a shared experience for all. We offer free webspace for flying clubs and the website will continue to develop with flying in mind. We offer a range of packages to suit all skill levels and pockets. We can tailor the experience to what you want, particularly for groups, where special events can be arranged. There are two simulators, both within easy reach of the M25. For gifts, we can offer a voucher for any length of flight, to be redeemed at a time to suit the recipient (valid for one year). From time to time we will be having special offers. To register for these, or to make any enquiries, contact us on 07947 073483 or 01296 620402 (fax/answer phone), or email us on info@classicflight.co.uk."





External view of 747-400 simulator



Bit sluggish, isn't it? Brian in the 747-400 sim

commercial airliner terms, and so it can operate from smaller airports which might not have pushback facilities.

In contrast to the previous two planes, the DC-9 felt more like a zippy fighter than a commercial aircraft, especially when compared to the glacial movements of the 747-400. It responds very quickly to pilot

input, and executed quick emergency turns very smartly. It also needs the shortest runway space of the three, which even allows for crazy manoeuvres such as attempting to take off from a taxiway. (It might have worked if I wasn't so overzealous with the controls; I pulled up too hard and crashed the rear of the plane into the ground – thankfully my one and only crash during the entire three hour period.)

The analogue cockpit couldn't have been more different to the previous two cockpits. There wasn't a MFD to be found anywhere – just myriad gauges, dials, and switches. The only piece of 'modern' equipment in the entire cockpit is a small ACARS (Aircraft Communications Addressing and Reporting System) computer on the co-pilot's side of the centre panel, its text-based interface providing full communication facilities for the pilot and flight crew.

After flying in the three simulators I not only gained a new appreciation of the pilots who actually fly these amazing planes on a daily basis, but also understood how far PC simulations have developed in the last two decades, and how far they have to go.

The capabilities of PC simulations edge closer and closer to the level of realism present in their much more expensive commercial counterparts, which is quite a feat given the obvious differences between the two. Considering the lack of situational awareness available from your typical monitor, and the comparably inexpensive price of the necessary equipment and software, PC

simulations perform admirably. Having returned from my trip, I loaded an A320 into FS2000 and flew the plane through the same tests and trials that I experienced in Northwest's simulator, and found that the two actually behaved similarly. FS2000, of course, simply doesn't compare in terms of avionic, instrument, and environmental modelling; flying in a windy storm in a PC simulator is quite a different thing to flying in the same conditions in the full-motion simulator.

It's worth remembering, though, that simulators such as the ones owned by Northwest Airlines are realistic enough to allow a qualified pilot to obtain a commercial type rating without ever having set foot in the real plane. Pilots can also return to these simulators every few months in order to keep their skills and talents sharp and to retain their currency. 747 pilots, for example, are required to perform three take-offs and landings every three months, or ninety days, both during the day and at night. Since a 747-400 only needs one pilot at a time, it can be difficult for a pilot to maintain their level of currency based on scheduled flights alone, so the simulator allows them to get their time in.

While a PC simulator can hardly hope to recreate the feelings and sounds of the \$15m commercial version, it's encouraging nonetheless to see how close they are getting to really capturing the feel of an aircraft. Considering the limitations of our beloved PCs, I'd say that the gap is being slowly but surely narrowed. ■

Brian Rubin

Ban this terrorist trainer!

Following the events of September 11th the Daily Express, in an attempt to get another headline out of the tragedy, 'secretly' booked a day out in the VirtualAviation simulator. They even told the person who took the booking that their party consisted of people of 'middle-eastern' appearance. Fortunately, this is not a crime in the UK, despite the best efforts of the Express, but because Virtual did not impose any extra conditions on the 'middle-eastern' visitors, the Express took this as a sign that they were keen to train terrorists and splashed a ridiculous and alarmist article on the front page. We've included VirtualAviation's reply below (which probably wasn't printed in the Express). The Express has a long tradition of this sort of accurate reporting. Next time the excellent film 'In Which We Serve' starring Noel Coward is on the telly, pay close attention to the part where Coward, playing a Naval Officer based on Lord Mountbatten, is summoned to the Admiralty because war has finally broken out. As he climbs out of a taxi in the pouring rain, a copy of the Daily Express can be seen floating down the gutter with the headline "No War – Official".

VirtualAviation's response to the Daily Express article:

An article in the Daily Express has suggested that flight simulators are being made too widely available following the recent terrorist attacks in the USA.

Like everybody, we were shocked and horrified by the events of September 11th.

We immediately suspended our simulator flights for a period of review. During that time we sought direction from customers and pilots as to whether it would be appropriate to restart. We were in contact with the Civil Aviation Authority, the Department of Transport and Scotland Yard's Anti-Terrorist Squad. It was concluded that the continuation of these fun flights didn't represent a security risk. However, enhanced security procedures were immediately introduced as an extra safety measure. We keep detailed contact information of all customers and this is made available to Scotland Yard.

Simulator fun flights would be of no benefit to potential terrorists. That's because they do not offer professional pilot training in any way whatsoever. Learning to fly an airliner involves several thousand hours of professional pilot training, starting with light aircraft. There are NO shortcuts. It's rather like flying one of the hugely popular PC flight simulators, but with full motion



and a real pilot. The fun flights are never promoted as 'lessons' or 'training' in any way.

The article sensationally claims to have "exposed" our offer of simulator fun flights. On the contrary, our fun flights are well-known, and have received lots of very favourable media coverage in the national press and on TV.

How to become an Install Wizard

Roll up your sleeves...this is going to be dirty!

One of the things that make our hobby so unique is the sheer volume of freeware files created by talented and unselfish authors that we can download from the Internet. These provide us with everything from new scenery and aircraft to dozens of equally useful utilities. However, judging from the number of letters and e-mails we receive, this is one area that seems to present more problems to users than any other.

Unfortunately there's no really foolproof method of getting these products to work, because the authors can package the item in any number of ways; files may simply be available inside a Zip or some other form of compressed file, or they may require a full-blown installation routine exactly like any other commercial product (in which case the installation should be fairly straightforward). So here's a general guide to installing add-ons into Flight Simulator, using a few recent files downloaded from www.flightsim.com as examples. We'll also look at the subtle differences between installing into FS2000 and FS2002.

Aircraft

There are generally two common problems when installing aircraft. The first is getting the files into your simulator in the first place, and the second is making sure that the panel and sound files you want are the ones that the simulator actually uses. But let's start right at the beginning with Zip files, which are basically one or more files compressed into a single file, making it smaller and consequently easier to transport.

In order to unzip (or uncompress) these files you'll need a utility called WinZip, a shareware program that has appeared on our cover CD many times. In the unlikely event that you haven't already got it, you can simply download it from numerous Internet sites. Once this is installed, double clicking on a Zip file will launch the program and

show you the contents of the Zip in a window. The important part to note here is the very last column on the right which has the word 'Path' at the top (Figure 1). This tells us whether the author constructed the Zip file using the correct destination path (or directory) names. If there's no information in this column you can assume the author didn't, which makes the job of installing the aircraft quite a bit more awkward. On a more positive note, you'll find that most authors do this correctly.

We'll continue on the premise that the author was considerate and provided us with the directory path already set; all you have to do in this case is click on the Extract button and point WinZip in the right direction, which is the directory you installed Flight Simulator into. In most cases the default directory for aircraft files is:

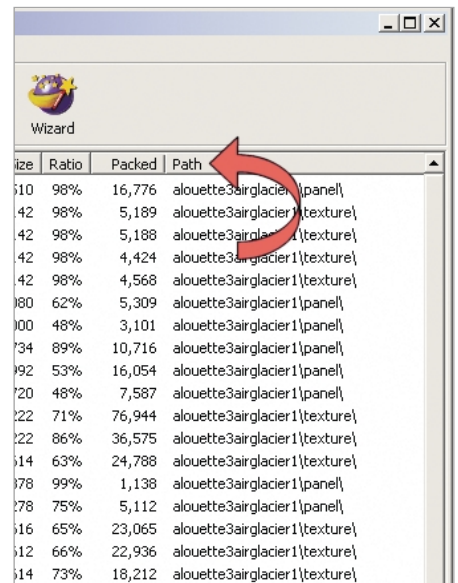


Fig. 1: This shows the path set by the author

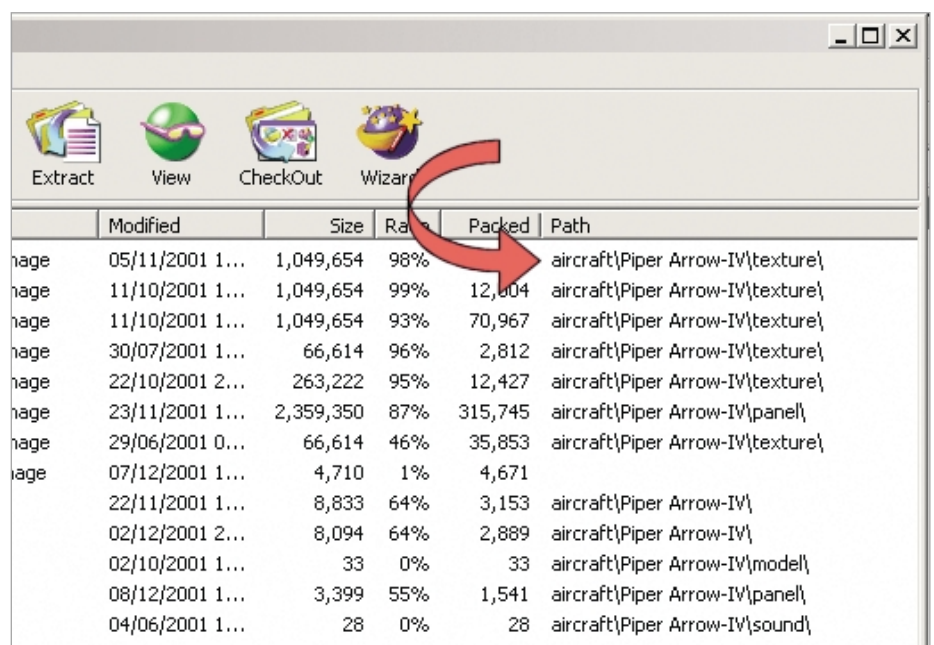


Fig. 2: Look to see if the aircraft directory is included

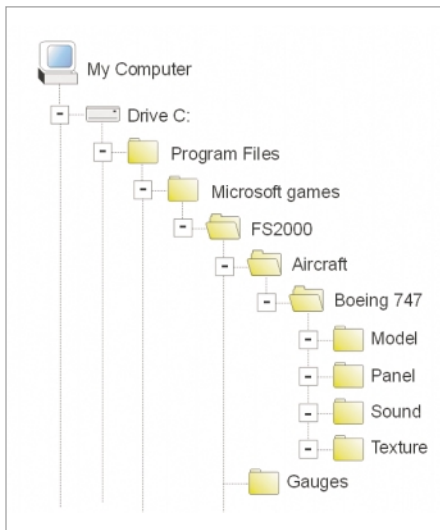


Fig. 3: A typical aircraft file structure

For FS2000:
C:\Program Files\Microsoft Games\FS2000\Aircraft

For FS2002:
C:\Program Files\Microsoft Games\FS2002\Aircraft

This is assuming you installed FS on your C: drive and didn't change the directory and, of course, that you're actually using either FS2000 or FS2002. If this is not the case

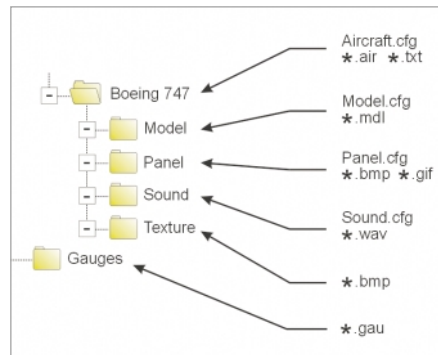


Fig. 4: What you'll find inside the directories

then you need to substitute the drive letter and directory you chose when you installed it. One thing to note here is the specific information you see in the Zip window, because the author may or may not have included the word 'aircraft' at the beginning of the path (Figure 2). If the word is there you simply navigate to the main FS directory, i.e.

C:\Program Files\Microsoft Games\FS2000 (or 2002), and WinZip will unzip the files correctly. If you can only see the name of the aircraft (or in some cases just the basic folders) then select the longer path as shown originally, C:\Program Files\Microsoft Games\FS2000\Aircraft. In cases where the author has not nominated a

directory for the aircraft itself, you have to use the 'New Folder' option in the lower right corner of the Zip extract dialogue.

You may still have some work to do, because the panel, gauges and sound files may be not be stored within the Zip in this way. Some authors will put the panel and sound files in separate Zips within the main Zip file, in which case you have to extract them to a temporary directory and cut and paste them into the correct place. Generally speaking, the files should be placed in the directories shown in the default arrangement (Figure 3). This shows the default directory structure, while Figure 4 shows the file types you would normally expect to find there. For those who may be unfamiliar with directory structures, the asterisk in this context is a wild card symbol that denotes any file with the file extension shown.

To try and clarify how this all works, we'll install the C-17 package from the cover CD, which is ideal because it's in three parts. We begin with the aircraft file itself (POSkyC17.zip) otherwise there will be nowhere to install the other components. As you can see (Figure 5) the author has packed the file using the aircraft name, followed by the directory where each file needs to reside. Using the previous instructions, therefore, you need to extract the files using the path that includes the 'Aircraft' folder, making sure that you tick the 'Use folder names' box in WinZip, as indicated in Figure 6. If all goes well you should then have a directory called POSkyC17, with four subdirectories labelled model, panel, sound and texture. In fact you'll have four texture directories, because this aircraft has four different liveries.

Now we need to unzip the panel (c17pan02.zip) into the empty panel directory waiting for it. As you can see (Figure 7), the author of the panel has not nominated a path when creating the Zip file, so we need to type it in or browse to the correct directory. This is:

C:\Program Files\Microsoft Games\FS2002\Aircraft\POSkyC17\Panel (again assuming the default installation for FS; if this is not the case, substitute the drive and directory you chose originally). When you instruct WinZip to extract the files, you may get a warning telling you that a file is about to be overwritten. This is not an error; it simply means that the default panel.cfg file is about to be replaced by the new configuration file for the C-17 panel. You'll also notice that there is another Zip file within the panel Zip; this contains the gauges. It has to be unzipped into the gauge directory, which is outside our new C-17 directory in the main FS2002 directory.

The final stage is to unzip Aaron Swindle's sound set (POSC17sz) into the appropriate

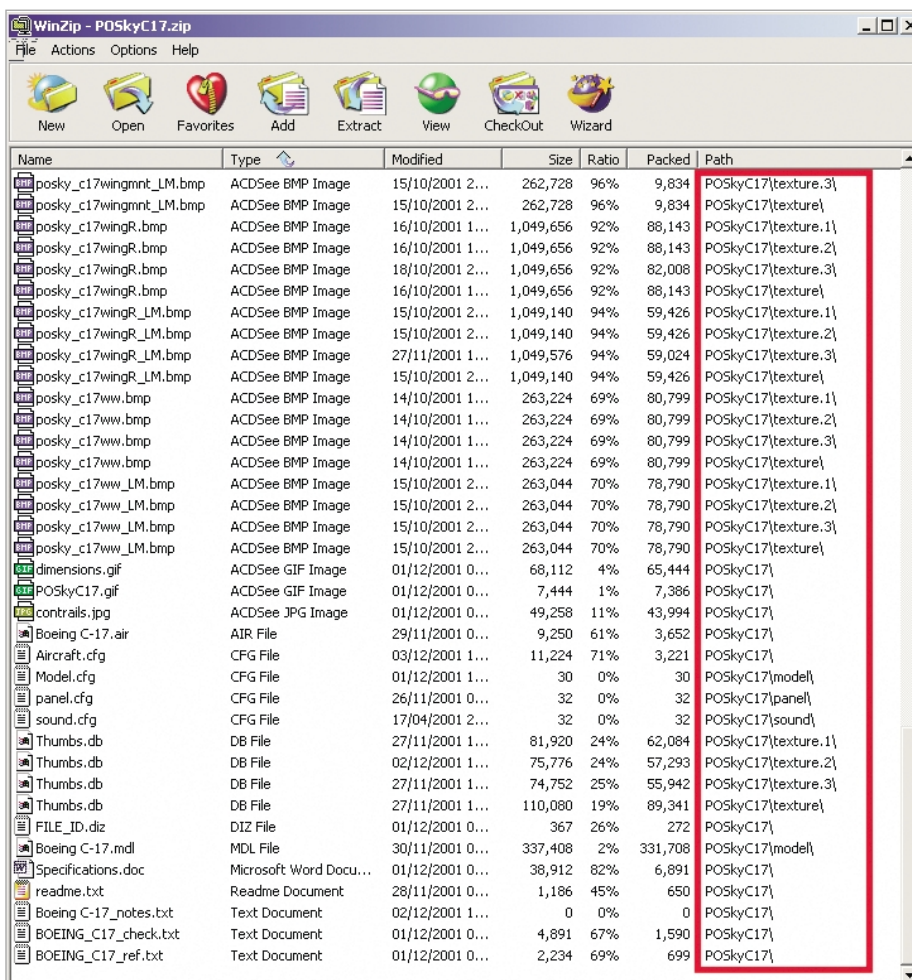


Fig 5: The C-17 file structure

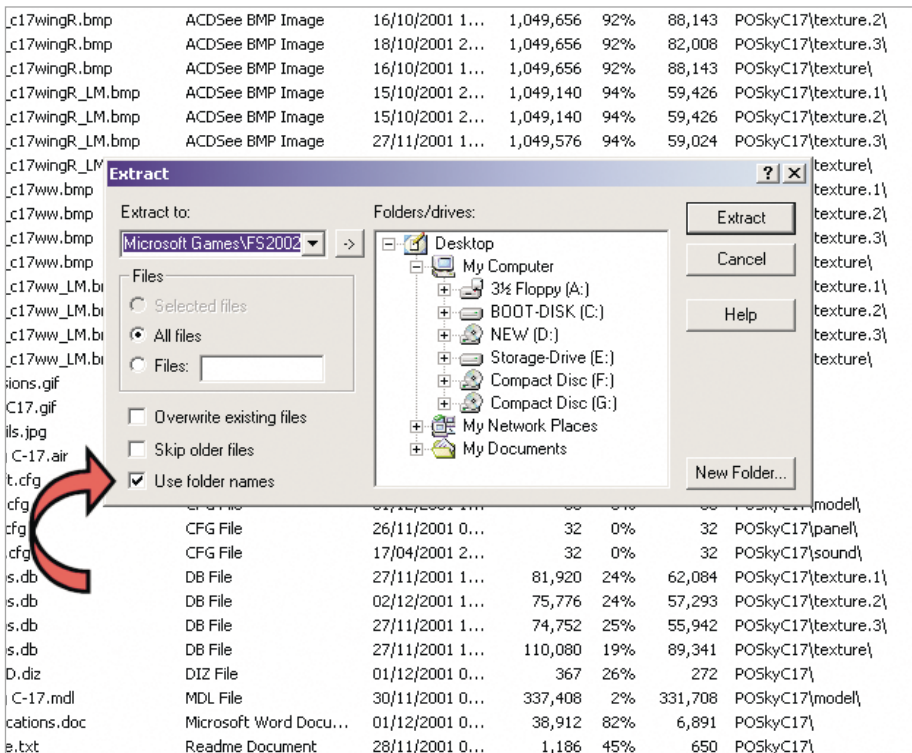


Fig. 6: Check the 'use folder names' option

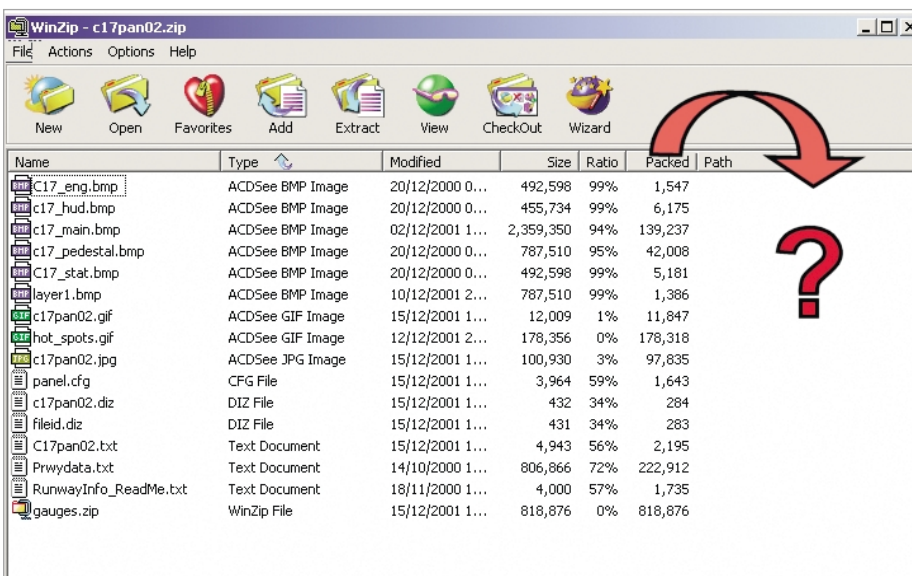


Fig. 7: Notice that no path is set here

directory, in much the same way as we did with the panel. Not quite the same way, in fact, because the nice Mr. Swindle has provided us with an installation program that will do it for you. If you double click on the C17.exe file within the Zip (Figure 8) it will launch from there, and you only need to follow the instructions to complete the installation. At this point you should be able to launch Flight Simulator and go flying in the Project Open Sky C-17.

If all this looks a bit complicated, don't abandon it; have a go at installing a few aircraft – it's much easier than it appears. After the first few attempts you'll begin to recognise which files go where, and when the authors get it wrong you'll know how to sort it out.

FS2000 aircraft in FS2002

Before we finish dealing with aircraft, let's have a look at getting FS2000 aircraft to work in FS2002. Most of the time FS2000 aircraft will work quite happily in the 2002 version, although they will not appear correctly in the aircraft selection menu. They'll normally be found in the unspecified folder unless you add a few new lines to the aircraft.cfg file. This is a fairly straightforward exercise that should present no problems, as long as you can cut and paste using Windows Notepad.

The lines in question are found in the first section under the heading of [fltsim.0]. You need to add the following lines after the atc_id= entry while using, of course, the

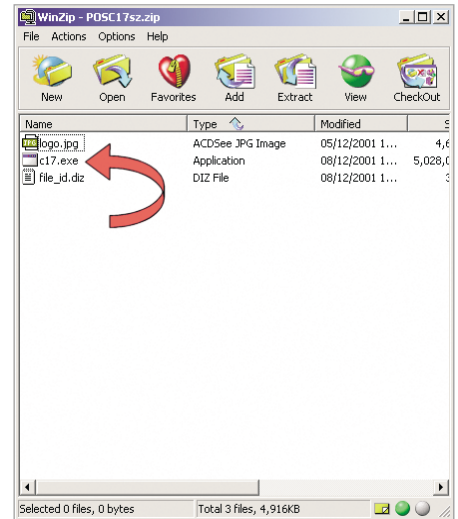


Fig. 8: The automatic sound installation program

appropriate data for the aircraft you're installing.

ui_manufacturer=Beechcraft

ui_type=Baron

ui_variation=red with white and gold trim

description=whatever you want to add

Incidentally, if you add your own call sign after the atc_id= entry, the FS ATC will use it when calling you.

Another problem that can be fixed with a bit more .cfg editing is that of imported FS2000 aircraft jumping and rocking for no apparent reason. It seems that the flight tuning is slightly different in FS2002, and some imported aircraft are erratic until certain values are changed. The section responsible comes under the heading of [flight tuning]; you should check the values of aileron_effectiveness and roll_stability because FS2002 adds its own arbitrary values for these when you first load the aircraft. You can also try changing the pitot_static value to 10 instead of the default 1. Some of this information, we should add at this point, was gleaned from the excellent Tips and Hints section of the Flightsim Veterans Club at

www.flightsimnetwork.com/flightsimvetclub/home.htm – it's well worth a visit.

Scenery

Getting new scenery to appear in FS2002 is a little more straightforward, although simply putting the files in the right place is no guarantee that FS will know what to do with them. In general terms, if you place them in the Addon Scenery directory, they will be recognised when you launch FS2002; this is fine if there's no other native scenery to conflict with them, but in most cases you'll need to edit the scenery configuration text file (scenery.cfg) as well. This is found in the main FS directory and is necessary to tell FS to ignore the original data and use the new data instead. You should find this information in a Readme file

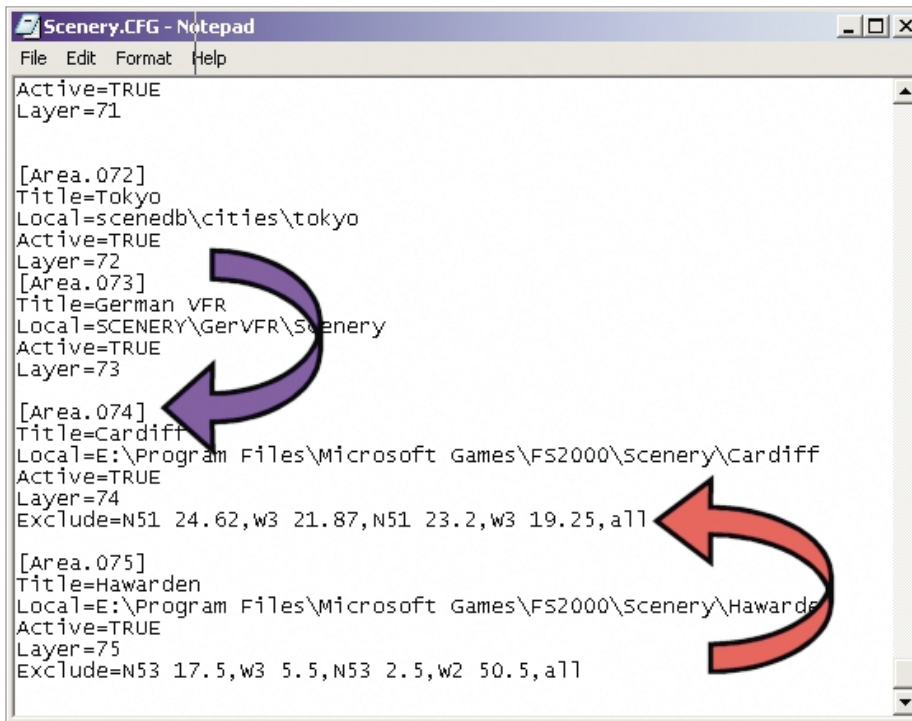


Fig. 9: These are the items to change in the scenery.cfg

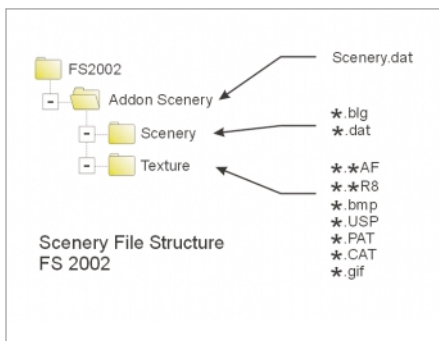


Fig. 10: File structure for FS2002 Scenery

inside the scenery Zip file you downloaded; otherwise you can assume the author has handled it for you.

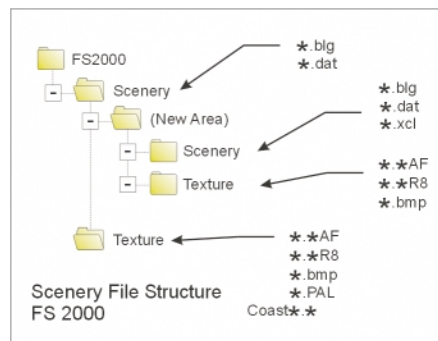


Fig. 11: File structure for FS2000 Scenery

A typical instruction to flatten or exclude is shown in Figure 9. Another important point here is the [Area.074] indicated by a blue arrow in our example, which has to follow

onto the last number in your own scenery.cfg. Obviously this is unlikely to be the same as the one shown in ours. The arrangement of scenery directories in FS2002 is not overly complicated, because all new scenery is placed in the Addon Scenery directory. This contains just two subdirectories, named 'Scenery' and 'Texture'. You'll find that scenery designers, almost without exception, will zip their files using the 'Use folder' option, making them a breeze to install. Just in case they don't, however, Figure 10 shows the file structures and types you can expect to find inside this directory.

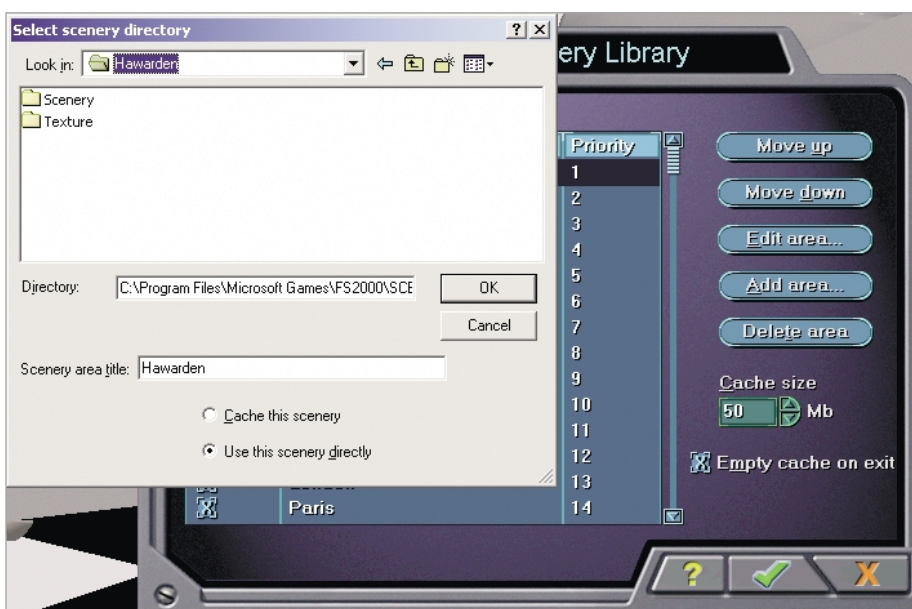
The only drawback with installing scenery in this way is that it all gets thrown into the same directory, making it almost impossible to uninstall it later. We would recommend installing new scenery in a separate folder, although you'll need to use the 'add scenery' option in FS2002.

The directory structure in FS2000 is different (Figure 11), and you may find that some of the files have to be moved from the scenery folder into the main texture folder. Once again, authors are aware of this and in most cases will prepare the Zip file to be ready for installation. Having unzipped them into the right folders, you'll need to go into the scenery library option within FS and add the scenery area so that FS knows it's there. Alternatively you can edit the scenery.cfg file directly, as described in the last paragraph and shown in Figure 9. If the author has not provided this data, then you'll have to install through the normal 'add scenery' menu option in FS2000.

If you want to try a third party installation program without spending any cash, have a look at JAB2000 from Jacky Brouze; it's still available from many of the FS sites, although it's sadly no longer supported by its author because of piracy issues. Jacky has informed us that JAB2000 can be tweaked to work with FS2002 by changing the default path from FS2000 to the new location of FS2002. Alternatively, the excellent Addit Pro from Joe Stearn is well worth a look and, as it's a shareware product, you can try before you buy. We have included his latest version, which now supports FS2002, on the cover CD. If you're still using previous versions of Flight Simulator, don't worry, because we've included versions for FS98, FS2000, and CFS as well.

We have tried to cover as much as possible in this article, but a word of warning: because this is a relatively complex subject there are bound to be scenarios that fall outside the examples we have given. In such cases always read thoroughly any documentation, and in the last resort, e-mail the author if you encounter problems. ■

Joe Lavery



'Add scenery' dialogue in FS2000

Flight Sim Training

*Professional
instruction
with Bill Stack*



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BEFORE YOU START

OUR FLIGHT AND AIRPORTS

Today's 80-mile (128-km) tutorial will take us from Rotterdam (EHRD) to Maastricht (EHBK), both in Holland. Rotterdam is a commercial airport with commuter flights to several European cities; Maastricht is a commercial airport in the southernmost tip of Holland and is the Netherlands' second busiest air cargo facility, behind Amsterdam's Schiphol.

During this flight we will use flight levels for the first time in our tutorials. Basically, using flight levels requires a different altimeter setting than using altitudes does. Read the section about flight levels for details.

Our arrival at Maastricht will present us with a new challenge after a rather uneventful flight across the Netherlands. Maastricht's only two instrument approach procedures are from the northeast, but today's wind is also from the north. That means we'll either land with a tailwind, which we don't want, or we'll do a 'circling approach' to the other runway. Once again, those who dismiss visual flying as too easy will find those skills very necessary today.

OUR AIRCRAFT

As usual, we'll fly our Mooney Bravo for this tutorial. It's an easy plane to fly, and it gets us to our destinations in about 25% less time than the Cessna 182s. In the Bravo, this 80-mile flight will take about 40 minutes.

THE CHARTS

Be sure to familiarise yourself with the Jeppesen charts we will use for these tutorials before embarking on this flight, so you will know what to do aloft. These charts show the flight path, fixes and navigation aids. As well as the charts that you'll see in this tutorial, we've included high resolution images on the cover CD.

USE FLIGHT PLANS

Flight plans are required for instrument flight, so we always recommend using them for the most realistic flight simulations. You are free to use paper plans or an electronic flight planner. Paper plans are a bit clumsy to make but easier to use aloft. Electronic plans are easy to make, but using them aloft requires following submenus that disrupt the simulation.

In lieu of filing your flight plan with ATC as real pilots do, imagine that you have filed in accordance with regulations. Keep your flight plan handy throughout the flight so you can easily refer to it.

COMPENSATE FOR WIND

Be sure to account for winds in your plan, because deviations from your desired course will consume additional fuel and delay your arrival. Our Issue 4 tutorial explains wind compensation in detail.

MONITOR YOUR PROGRESS AND STATUS

Throughout your flight, check your instruments for the status of your aircraft and engine. Frequently check your position, radio nav aids, time/speed/heading and/or GPS. Monitor your engine-temperature, oil-pressure, fuel-flow and fuel-supply gauges. Correct as necessary to maintain desired course, altitude and performance levels. At the end of the flight, compare your estimates to the actual performance in time and fuel consumption.

AIR TRAFFIC CONTROL

With the addition of air traffic control in FS2002, we'll be giving more ATC guidance in our tutorials. Today's flight from one place to another within Holland will take us through moderately travelled airspace over the European

continent. Moreover, we'll take off and land at controlled airports where no procedures can be performed without ATC clearances (except in emergencies). If you don't have ATC in your sim, pretend that you are performing the recommended ATC communications.

FLY ONE STEP AT A TIME

While leaping over the basics and plunging into advanced flights is a great luxury of flight simulation, it is not realistic. Real pilots do not start at the end of the training course and work backwards, because it deprives them of the skills needed for meeting subsequent challenges. So we strongly advise doing everything one step at a time and building your skills toward the next levels, just as real pilots do.

USE THESE TUTORIALS FOR FLIGHT SIMMING ONLY

These tutorials are intended for computer flight simulations, not for real-world aviation or real-world flight training. While making our tutorials as realistic as possible, we have adapted them out of necessity to the limits and nuances of flight simulation, so some aspects cannot and do not apply to real world flight. Therefore, we caution everyone to use these tutorials for their intended purposes, and we accept no liability for anybody's misuse of them.

OUR AUTHORS

Bill Stack is an expert flight simmer and author of several popular flight sim books. Nels Anderson, our technical consultant, is a certified pilot and president of flightsim.com

Learn more about flying like a real pilot from Bill Stack's flight sim books at www.topskills.com/flitsim.htm or contact TopSkills in Tennessee on 865-584-7340.

REFER TO OUR PRIOR TUTORIALS

If you don't have our previous tutorials, back issues are available from PC Pilot. Issues 1, 2 and 3 are now sold out, but we've re-published them in CD format, together with Tutorials 1-8. This is great value with prices from £7.99. For more details see our subscriptions page or the website.

- Issue 1** Taking off, flying straight and level, flying traffic pattern, landing, simple ILS approach. London City (circuit)
- Issue 2** Cross-country flight, VFR pilotage, IFR radio navigation, using SIDs, STARs, IAPs London City - London Stansted
- Issue 3** Attitude flying, VFR dead reckoning, IFR NDB Approach London Stansted - Birmingham
- Issue 4** Wind compensation, VFR with radio navigation, IFR VOR/DME approach Birmingham - Dublin
- Issue 5** VFR scenic coastal flight, IFR fixes, holds, procedure turn, ILS approach Dublin - Glasgow

- Issue 6** Night flying Glasgow - Manchester
- Issue 7** Global positioning system Manchester - London Heathrow
- Issue 8** Fuel calculation Heathrow - Cork
- Issue 9** Flying a back course - Hanscom to New Bedford
- Issue 10** LDA Approaches - New Bedford to Brainard

- Issue 11** Using a DME-ARC Approach - Humberside to Norwich
- Issue 12** Using airports of differing elevations - Blackpool to Leeds-Bradford
- Issue 13** Mountain flying - Hartford Connecticut to Pittsfield Massachusetts
- Issue 14** Norwich to Rotterdam with a loss of navigation and communication radios



FLIGHT SETUP

Prepare your simulator for your flight. It takes only a few minutes and makes your flight more challenging, more realistic and more fulfilling.

CIRCLING APPROACH

A circling approach, which is also called a circle-to-land manoeuvre, is useful when conditions at an airport make landing on a runway undesirable or impossible. Simply stated, the pilot uses the IAP (Instrument Approach Procedure) to reach the decision point, then flies visually to the opposite end of the runway or to a different runway altogether for landing. The most common condition warranting a circling approach is when the IAP would result in a downwind landing, as will be the case when we arrive there. Another is when the IAP leads to a temporarily closed runway. These conditions can present themselves at any airport, so every instrument flight simmer should know how to perform a circling approach for the utmost realism.

FLIGHT LEVELS

This flight will also expose us to flight levels. A flight level is officially defined by the ICAO (International Civil Aviation Organization) as ‘a surface of constant atmospheric pressure which is related to a specific pressure datum of 1013.2 millibars [29.92 inches of mercury]’. This standard is commonly called QNE. As a broad generality, altitudes based on local barometric pressure, commonly called QNH, are used at low levels and around airports where atmospheric pressure varies considerably, and flight levels are used aloft. The transition level between altitudes and flight levels differs from country to country. It is 18,000 feet in the United States, for example, 10,000 feet in Australia, and 4,000 feet in the Netherlands. As pilots climb and descend through this transition level, they adjust their altimeter settings for QNH or QNE as appropriate.

GET YOUR WEATHER BRIEFING

When we began writing this tutorial in October 2001, winter was settling in on Europe. Surface temperatures were near freezing, and the weather was frequently rainy or cloudy. Temperatures in Holland were around 5°C (40°F) overnight and around 10°C (50°F) in the afternoon. To ensure instrument conditions, we’ll use cloud covers that will block our views of terrain for most of the flight, so set your weather as shown in our weather tables.

Today’s Weather at Rotterdam

Visibility: 10 miles
 Wind: 15 knots from 350 degrees
 Clouds: Stratus, broken 5/8, Ceiling 2,500 MSL, Top 5,500 MSL
 Icing: light
 Precipitation: light rain
 Temperature, dew point up to 3,000: 50°F/10°C, 46°F/08°C
 Temperature, dew point up to 6,000: 35°F/02°C, 31°F/00°C
 Temperature, dew point up to 9,000: 20°F/06°C, 18°F/08°C
 Temperature, dew point up to 12,000: 05°F/-15°C, -08°F/-22°C
 Temperature, dew point up to 15,000: -10°F/-24°C, -14°F/-26°C
 Pressure: 29.94

Today’s Weather at Maastricht

Visibility: 5 miles
 Wind: 10 knots from 010 degrees

Clouds: Stratus, broken 6/8, Ceiling 1,500 MSL, Top 5,000 MSL
 Icing: light
 Precipitation: light rain
 Temperature, dew point up to 3,000: 52°F/11°C, 50°F/10°C
 Temperature, dew point up to 6,000: 37°F/03°C, 36°F/04°C
 Temperature, dew point up to 9,000: 22°F/-06°C, 20°F/-07°C
 Temperature, dew point up to 12,000: 07°F/-14°C, 05°F/-15°C
 Temperature, dew point up to 15,000: -08°F/-22°C, -10°F/-23°C
 Pressure: 29.90

Making this flight during daylight or at night is your choice, because there is no practical difference for instrument flights. To make the flight a bit more interesting, try taking off before dusk or dawn so light conditions will change en route.

PREPARE YOUR AIRCRAFT

Be sure to prepare your aircraft for flight before taking off by setting your radios and gauges and turning on your lights. The following conditions generally apply to most flights. For this flight, choose the Mooney Bravo, preferably the IFR version. All our time estimates are based on this aircraft. Because the 15-knot wind at Rotterdam is from 350, the best runway for taking off is 06. Start your flight at the take-off point of runway 06. Calculate your fuel needs and carry enough for this trip, using the aircraft’s average fuel-flow rate plus legal requirements to determine the amount of needed fuel. Remember that our Mooney Bravo uses about 16.5 gallons of fuel per hour from take-off to landing and we must include enough to reach an alternate airport and remain aloft for an additional 45 minutes. Our estimate for today’s flight is between 20 and 30 gallons. What’s yours?

SET UP YOUR AIRCRAFT

‘Buy’ enough fuel based on your fuel calculations. Your fuel mixture should be rich, and your propeller pitch should be low at these low altitudes. The cowl flaps should be fully open while on the ground and during take-off and climbout. The carburettor heat should be off, because it is not needed and its use will reduce performance when the best is needed. The pitot heat won’t be needed unless the temperatures are below freezing and there’s moisture in the air.

TUNE YOUR RADIOS

Although you can rely on your GPS for navigation, you still need your conventional radio nav aids for airport operations and as a backup during the en route portions. Set your Nav-1 and Nav-2 radios and your OBI for the first frequencies and radials you will use.

SET YOUR GPS

Engage your GPS by displaying it on your screen, then check the displayed course to be sure it reflects your desired flight path. Don’t worry about SIDs, STARs or IAPs, because the Microsoft GPS does not reflect them. Set the map for ‘north up’, ‘course up’ or ‘track up’, whichever you like best.

As usual, pilots should know how to use the GPS devices in their simulators - how to engage the devices, change view screens, select data and so forth.

SET YOUR GAUGES

As standard procedure, set your altimeter for local barometric pressure.

TURN ON YOUR LIGHTS

Turn on the lights appropriate for this flight. Nothing is wrong with using the position lights and strobes during daylight operations, even though they are required only for night flights. Strobes are required at night except when their reflections from clouds would present a safety hazard to the pilot. Landing lights are recommended for taking off, landing and whenever flying below 10,000 feet (3,050m) above MSL (mean sea level).

PREPARATION CHECKLIST

(This checklist is for these tutorials only, and is not intended to be complete.)

Aircraft Settings

Engine: running
 Fuel supply: adequate
 Fuel mixture: richest
 Propeller pitch: highest
 Cowl flaps: open fully
 Wing flaps: 10% (specified by Mooney)
 Carburettor heat: off
 Pitot heat: as needed
 Rudder: straight
 Ailerons: neutral
 Elevator trim: neutral

Gauges

Altimeter: local pressure
 Amperes: neutral
 Vacuum: green
 Oil pressure: green
 Fuel pressure: 24 psi (specified by Mooney)

Radios

Com-1: 118.20 (Rotterdam Tower)
 Com-2: 123.4 not needed
 Nav-1: 108.6 (Maastricht MAS)
 Nav-1 Standby: 108.5 (Maastricht ILS)
 Nav-2: 110.4 (Rotterdam RTM)
 Nav-2 Standby: 108.6 (Maastricht MAS)
 OBI-1: 137/317
 OBI-2: 161/341
 ADF: 373 Maastricht (NW)

GPS

Map view: on
 Orientation: as desired
 Zoom level: as appropriate
 Plotted course: as filed
 Displayed: as needed

Lights

Beacon: ON
 Strobe: ON
 Position (navigation): ON
 Landing: ON
 Taxi: ON

Clock

Local time or your choice

Simulator

Aircraft runs out of fuel

Make a Flight

After you’ve set up your aircraft, make a flight so you can bypass all these efforts on repeat flights of this tutorial. Name your flight ‘Rotterdam EHRD 06 TO Bravo’. In the description box, enter ‘Taking off from Rotterdam (EHRD), Holland, for Maastricht (EHBK), Holland, in the Mooney Bravo for PC Pilot tutorial 15’.

IFR (Instrument Flight Rules Tutorial) Part 15

Getting Around - Circling the airport for a circle-to-land manoeuvre

Today's European flight challenges us by combining instrument-flight with visual-flight skills. In this case, we will approach the destination airport on instruments, then fly around it visually for a landing at the opposite runway. This is called a circle-to-land manoeuvre and a circling approach; both of these common terms refer to the same procedure.

Additionally, we will use flight levels, which differ from altitudes. Read the introductory paragraphs about flight levels for details.

For users of FS2002, ATC will give you more things to do and keep you busy during the mundane en route portion of the flight. Others should pretend that communications are available when and where appropriate. Remember that nothing would be done at these airports without ATC clearances unless communication radios were inoperative.

YOUR FLIGHT CHARTS

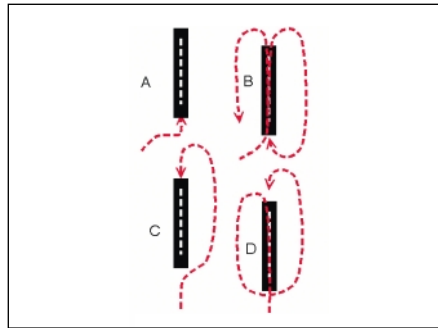
The charts for today's flight show the instrument procedures for all its portions: 1) departing Rotterdam Airport (EHRD); 2) flying southward over the Netherlands; and 3) approaching Maastricht Airport (EHBK). Familiarize yourself with all relevant aspects of these charts before taking off so you won't have to fumble around en route trying to figure them out. Because some of the instrument procedure charts are not to scale, the courses depicted on them are not precisely drawn. On these charts, follow the textual directions and use the graphical depictions for comprehension only.

Departure

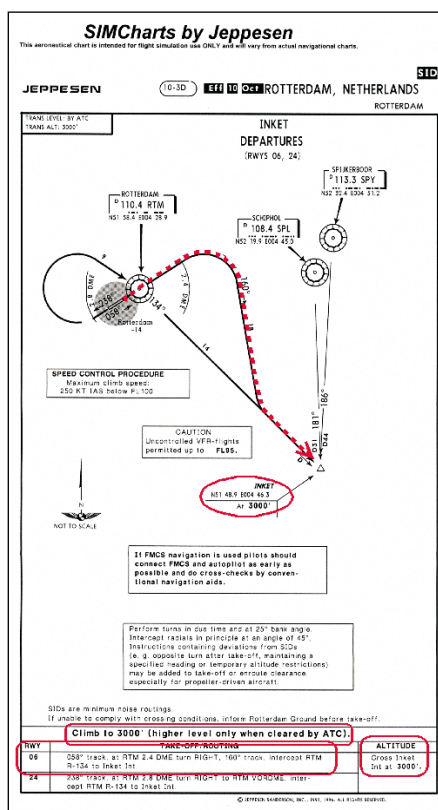
With the wind coming from the north, we'll take off from Rotterdam's runway 06. One of this airport's several SID procedures, INKET, is well suited to our flight; it leads us into a right turn from runway 06, then southeasterly towards our destination, and it ends at a waypoint named INKET, thus its name.

En route

Jeppesen's en route chart shows a convenient airway between INKET and Maastricht – R57, but this airway has very unusual altitude restrictions. The MEA (Minimum En route Altitude) is FL60 (approximately 6,000 feet or 1,830 metres MSL). The MAA (Maximum Authorized Altitude) is FL70 (approximately 7,000 feet or 2,135 metres MSL). These indications mean that all traffic on this airway is restricted to this 1,000-foot vertical space. We checked with Jeppesen, and they explained that FL60 is minimum and maximum for westbound traffic and FL70 is minimum and maximum for eastbound



Approved circle-to-land manoeuvres



Rotterdam SID procedure showing approximate course

traffic. Therefore, we will cruise at FL70, which is about half the altitude we would like to use on this flight.

Approach

With winds at Maastricht coming from 010 degrees, the best runway for our landing is 04. However, both of Maastricht's IAPs (Instrument Approach Procedures) head south, and none are provided for runway 04. This selection of instrument procedures would result in a downwind landing. Therefore, we will use the runway 22 ILS approach to get us to within sight of the runway, then fly visually to the other end and land on runway 04. This is the circling

approach, or circle-to-land manoeuvre. Familiarize yourself with this procedure before you get there so you will have a better idea of what to do.

PLAN YOUR FLIGHT

Based on these charts, lay out the course you will fly from Rotterdam to Maastricht. Include the relevant airways, nav aids, intersections and fixes shown on the charts. Alternate airports are not required if the ceiling at the destination airport is above the circling approach minimums, and that condition is met at Maastricht today.

You are free to use traditional paper charts and flight plans or Microsoft's electronic flight planner. Paper charts and flight plans are still useful for seeing our course and estimated times at a glance. The electronic flight planner works with the GPS, and if you use it, the GPS will show the course you plotted. You might try the flight once with electronic flight planning and once without for the different experiences.

Enter the following data on your flight plan, whether paper or electronic:

Departure: Rotterdam, Holland (EHRD)
Runway 06
Arrival: Maastricht, Holland (EHBK)
Runway 04
Waypoint: Rotterdam VOR (RTM)
Waypoint: INKET intersection
Waypoint: WILMA intersection
Waypoint: Thorn NDB (THN)
Waypoint: Maastricht VOR (MAS)
Waypoint: Maastricht NDB (NW)
Altitude: 7,000 feet (1,830 metres) MSL

Note: We will not fly to MAS. This waypoint will be used only for establishing the course on the GPS screen. We will turn right towards the airport before reaching MAS.

BEGIN YOUR FLIGHT

After you have prepared your aircraft, your cockpit and yourself for this flight, contact ATC and request clearance to take off. Again, for those without ATC features, imagine these contacts and clearances.

TAKE OFF

As soon as you receive take-off clearance, set your transponder for the assigned squawk code and begin your take-off roll promptly. Enter 4275 if you don't have ATC; that's a code ATC gave us on one of our flights of this route. Don't dawdle after receiving take-off clearance, because safe traffic control relies on pilots following through and conducting themselves as

controllers and other pilots expect. Do not take off without proper clearance, as it will throw control of the airspace into disarray and bring ATC's wrath upon you.

Check your engine instruments during your take-off roll. The Bravo's manifold pressure should be at or above 38, and the oil pressure should be at least 24. The Bravo should lift off at about 60 to 65 knots. (Different characteristics apply to other aircraft.) If your aircraft isn't performing normally, abort your take-off.

During take-off and climbout on this flight, you will have a crosswind from the left. After changing heading to follow our chosen course, you will have a tailwind from about your 7 o'clock position.

Adjust your pitch to maintain about 85 knots during your climbout. As you're climbing, adjust your cowl flap to keep your engine temperature in the green range – not too hot or too cool.

After your initial climbout, your Bravo should be able to climb easily at 700 feet per minute and 120 knots. Retract your flaps when your airspeed reaches 90 knots.

You should receive RTM's DME (Distance Measuring Equipment) and audio signals while on the ground, because this VOR is right at Rotterdam airport. If not, recheck your frequency and be sure your DME and audio switches are set properly.

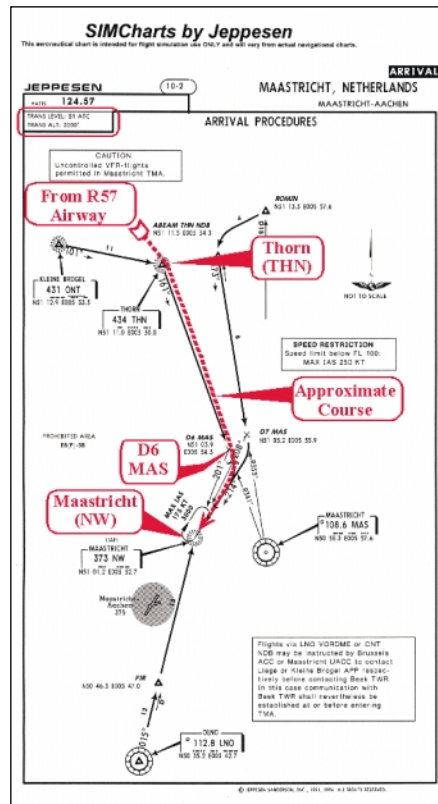
NOTAM: FS2002's ATC sometimes refers to Maastricht-Aachen airport as 'Beek' airport. That's an old name for it, and it's shown on Jeppesen's VFR chart, so don't get confused.

Turn on your pitot heat and de-icers whenever you pass through clouds during your climb and descent. The temperature is below freezing up there.

DEPART ROTTERDAM

INKET SID has several simple manoeuvres. First, head straight out from Rotterdam's runway 6 at a heading of 058 and right past RTM. When 2.4 miles from RTM per DME, turn right and head 160. Upon intersecting RTM's 134 radial, turn left and head 134 toward INKET intersection. At INKET, the SID ends and the en route portion of our flight begins.

The SID does not specify a departure climb rate, but it does specify a maximum climb speed of 250 knots. This maximum will not be a problem for anybody flying a Mooney Bravo, because it cannot fly that fast. If you fly this tutorial in a jet later, be sure to adhere to this requirement. The SID also says we should not climb above 3,000 feet (915 metres) MSL and we should cross INKET at 3,000 MSL. Notice that it doesn't say minimum or maximum; it says 'at'. Therefore, we should climb to 3,000 and maintain that altitude until we cross INKET, then climb to our FL70 cruising altitude after passing INKET.



Maastricht arrival procedure showing approximate course



Keeping the runway in view during the circling-approach manoeuvre

Be aware that some ATC communications do not regard you or your aircraft. They regard other aircraft flying in the area or communicating with the same controllers using the same frequency you are using. Follow only those communications that apply to you, and disregard the others. Use the 'say again' feature whenever you're not sure of what you heard.

A few minutes after taking off, the airport tower will hand you off to appropriate ATC. A handoff is transferring an aircraft's radar identification from one controlled airspace to another. In this case, your first handoff will be to Rotterdam departure. Soon thereafter, you'll be handed off to Soesterberg approach, then to Amsterdam Centre, then Hannover Centre, then Soesterberg approach (again). If you're not using any ATC features, imagine these hand-offs as you fly along.

If you use Microsoft's electronic flight planner, the GPS window shows your course to the destination airport. Simply follow the green course line. If you are using GPS but not the course plotter, maintain your 134-degree heading from RTM until you see the next waypoint on your GPS screen, then head straight for it.

NOTAM: On several of our test flights, FS2002's ATC repeatedly directed us to fly 185 en route to Maastricht, despite our filing an IFR flight plan showing a course of 137. This is one of numerous such glitches we've observed in this feature. If it happens to you, ignore it and maintain your course.

While GPS makes navigating and plotting very easy, it also eliminates the challenges that make these flights interesting. So to avoid the likely boredom, try relying on common radio navigation methods for maintaining your course and plotting your positions en route. You can use the DME features of RTM and MAS to help track your position en route, or you can use the age-old time/distance/speed method.

You should reach INKET intersection five or six minutes after taking off from Rotterdam, depending on your airspeed.

FLY EN ROUTE COURSE TO MAASTRICHT

After passing INKET, turn appropriately, head 137 and join the R57 airway towards MAS. Write down the time that you passed this waypoint. If you've followed the SID properly, you should be on RTM's 137 outbound radial. If not, adjust heading as necessary to align with that radial. Be sure to use RTM, not MAS. The airway is established by the 137 radial from RTM, not by the 137 course to MAS. The 350-degree wind will push you ahead and to the right. This effect will shorten the durations between waypoints and blow you slightly off course. You should reach WILMA intersection about 15 minutes after passing INKET.

As you climb through 4,000 feet MSL, you will transition from altitudes based on local barometric pressure (QNH) to flight levels based on standard pressure (QNE). Change your altimeter to 29.92 or 1013.2 when you climb through this level.

Remember from previous flights that your engine will behave differently at various altitudes. The higher it gets, the less oxygen it will have for combustion, so you will need to adjust the fuel/air mixture to compensate. The engine will not perform well at all otherwise. The engine is performing best when the TIT (Turbine Inlet Temperature) gauge reads between 1,600 and 1,700, so adjust the mixture so the TIT is within this range. Do not exceed 1,750. Again, these performance readings do not apply to other aircraft.

Icing is likely in this cold, wet weather. With surface temperatures being near freezing, all altitudes will be below freezing. (Although there are some exceptions to this basic guideline, they don't apply today.) This means that your aircraft is susceptible to icing as you fly through clouds during this flight, so turn on the de-icers when flying through clouds.

Conserve fuel by changing the propeller pitch at higher altitudes. Our Bravo cruised easily at 170 knots and used 15.50 gallons of fuel per hour with the following engine settings: RPM 2,100, manifold pressure 34 and TIT 1,600. If your engine is using fuel too quickly, you could run out of fuel short of your destination. Adjust your settings until your airspeed and fuel-flow rates are best.

Paying attention to your progress and status is always important regardless of the flight's length. You could easily pass important waypoints if you were distracted, sightseeing too much, or fumbling with charts.

Cruise en route

Once you have attained our FL70 cruising altitude, you may engage your autopilot or maintain altitude and heading manually with your elevator and rudder trims. Using autopilot relieves repetitive tasks, but being relieved of things to do makes the flight boring. Be sure your cowl flaps are closed whenever cruising. They are not needed, and they increase drag.

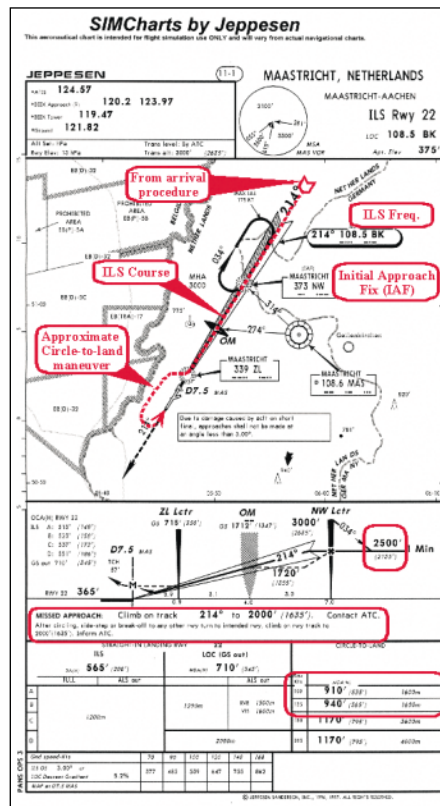
Although you'll be flying over plenty of lovely Dutch terrain, you won't see much of it during this IFR flight. For this reason, about 15 or 20 minutes of your flight is going to be rather boring. Pay attention to your aircraft's status, and keep it on course and at the proper altitude.

Cruising in the yellow zone of your airspeed indicator is all right if there is no turbulence. Abrupt manoeuvres are prohibited at these speeds, but straight and level flight is no problem in calm air. If you experience or expect any turbulence, keep your airspeed in the green zone. By the time you will make sharp turns for the airport approaches, your airspeed will be well within the green zone.

Use any free time during your en route cruise to familiarize yourself with the circle-to-land procedure at Maastricht. Read the instrument approach procedure chart, and jump ahead in this tutorial to the section about circle-to-land manoeuvres.

Descend towards your destination

The point where you will begin descending toward Maastricht is determined by your altitude and descent rate. At a 750-foot-per-minute descent rate, you will need to begin descending about 14 miles from MAS. Remember our simple formula for determining when to begin descending: cruise altitude (C) less target altitude (T) times 0.003 equals distance from target in miles (D), or $(C-T) \times 0.003 = D$. In this case, $7,000 - 2,500 = 4,500 \times 0.003 = 13.5$ miles.



Maastricht Runway 22 ILS approach showing

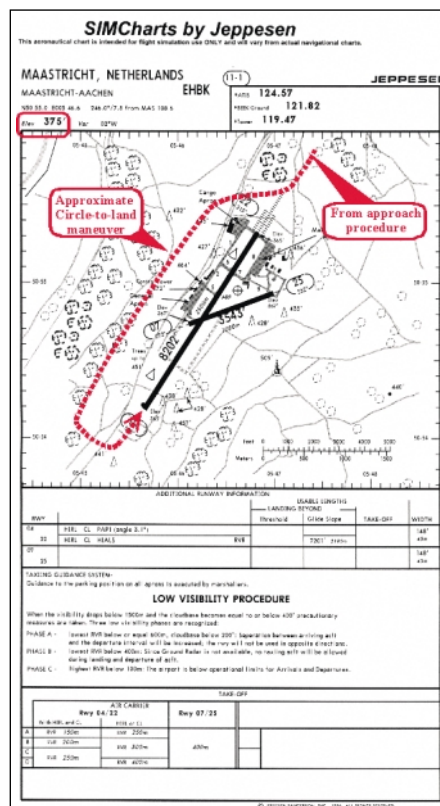


Diagram of Maastricht Airport showing approximate circle-to-land manoeuvre

On this flight, we will reach our descent point 30 to 35 minutes after leaving Rotterdam, depending on ground speed, of course.

When you descend below FL40, you will resume using QNH, so change your altimeter setting to whatever the QNH at Maastricht is.

This being flight simulation, your QNH is exactly what you entered in the weather menus when you established weather conditions before embarking on this flight. The QNH reading is also available from Maastricht's ATIS.

ARRIVE AT MAASTRICHT

When you reach WILMA intersection, you will be only two or three minutes from Thorn NDB (THN). Thorn is in the R57 airway as well as an entry into the arrival procedure for Maastricht's runway 22. Its dual purpose makes it a convenient transition from the airway to the arrival procedure. WILMA is a good place to reset your altimeter for local pressure so your altitudes will be correct when you enter the arrival procedure.

The arrival chart does not show an entry altitude. However, the instrument approach chart shows 2,500 feet MSL for entry into that procedure at NW. Therefore, we'll descend no lower than 2,500 for this arrival procedure and plan to be at that altitude when we arrive at NW. To accomplish this, adjust your airspeed and descent rate as needed. Be sure to reduce power, or you will gain airspeed on your descent and arrive at THN higher than desired.

You'll be only seven or eight minutes from Maastricht airport when you pass THN. Time will pass very quickly from here on, as you will see.

Pause your simulator anywhere you need to, because many tasks follow one another in quick succession, and you will not have a flight instructor in the cockpit to help you with these lessons.

After you pass THN, adjust your aircraft as follows to prepare for your approach and landing. Change your Nav-1 radio to 108.5 for the ILS, and change your Nav-2 radio to 108.6 for MAS. Set OBI-1 to 214/034 for the approach heading, and set OBI-2 for 161/341 for the brief course you will fly toward MAS. Set your ADF on 373 for NW. Switch fuel to the fuller tank. Set your altimeter for local pressure. Reduce your airspeed to about 120 knots so you can easily perform the turns in this procedure. Contact ATC and request landing clearance.

The arrival chart shows that we should turn right when at the D6 fix, which is six miles to MAS VOR, and head 214 towards NW along its 214 bearing. Execute this turn just when you reach D6. You will be about ten miles and about five minutes from the runway at this point.

Both the arrival chart and the IAP for Maastricht 22 show a holding pattern anchored on NW NDB. If we arrive at the initial approach fix (IAF) too high, we can use this pattern to reduce altitude.

Weather at the airport will vary when you arrive in its airspace because of the way Microsoft's FS manages weather. The clouds

will move from north to south (from 010 toward 190) at 10 knots in accordance with the weather conditions we selected before embarking on this flight. As a result of this cloud movement, exact conditions will differ at various times and for various simmers. Your view upon arriving in the airport's airspace might be obscured by clouds passing through, and it might be clear. ATIS will tell you only that clouds are broken, not where each cloud is.

APPROACH MAASTRICHT

Well before reaching NW, we should be able to pick up the ILS localizer and glide slope for runway 22. It's all right if you are below the glide slope at this point, as long as you don't descend below 2,500 feet.

You will intercept the glide slope at NW if you're at 2,500 feet when you get there. Adjust your heading as necessary to follow the localizer, and descend along the glide slope towards the runway. The approach chart shows seven miles between the runway and this NDB, so you will be seven miles and three or four minutes from the runway when you pass NW.

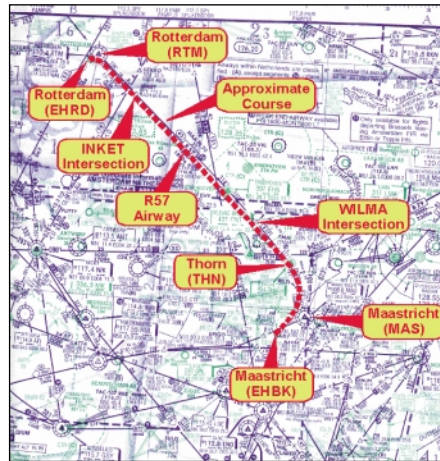
This ILS lacks DME, so we must rely on altitudes along the glide slope to let us know when we are at certain locations in the approach path. When you are at 1,000 feet MSL along the glide slope, you will be about one mile to the runway. The charted decision heights give us better indications of our distances to the runway. The decision height for our type-A aircraft is 513 MSL or 148 AGL. We'll be about half a mile from the runway at this point. If we can see the runway from this altitude while on the localizer and glide slope, we can proceed with landing.

Circle-to-land manoeuvre

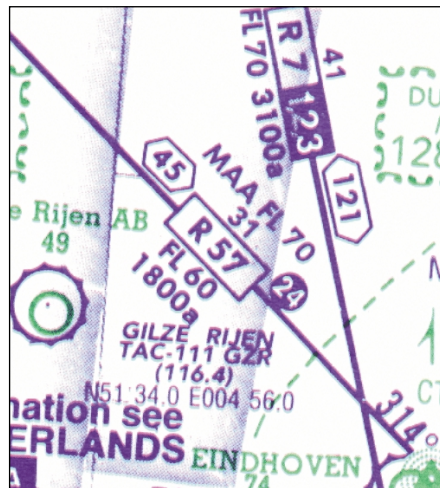
But we're not going to land on this runway, because we don't want a tailwind landing. Instead, we'll do a circle-to-land manoeuvre and land on runway 04, because we want a headwind landing. The minimums for circling approaches are higher than for instrument approaches, and they are based on airspeed instead of aircraft type. So we need to disregard the minimums for straight-in landing and use the higher minimums for circle-to-land manoeuvres.

You will do two things simultaneously when you reach the MDA (Minimum Descent Altitude) for your circling approach: 1) turn right and break off the approach to runway 22, and 2) level off at the MDA.

The circle-to-land box on the chart's lower right shows the following MDAs that apply to us: For aircraft approaching slower than 100 knots, the MDA is 910 MSL or 535 AGL; for aircraft approaching between 100 and 135 knots, the MDA is 940 MSL or 565 AGL. We should be approaching slower than 100 knots in our Bravo, but if you're approaching faster than that, use the higher MDA. If you're approaching faster than 135



IFR en route chart showing route and approximate course from Rotterdam SID to Maastricht arrival



Detail of R57 airway's unusual altitude restrictions

knots in another aircraft, use the appropriate MDA. Just before reaching the appropriate MDA, level off and stay at or above that minimum altitude. Be sure to increase power, too, and maintain your approach airspeed of 90 to 100 knots, or your airspeed will fall dangerously low and risk a low-altitude, low-power stall.

Authorities publish four patterns for circle-to-land manoeuvres from which pilots can choose according to conditions. The pattern that best fits our condition today is C, which simply calls for turning right then left in a 'side-step' manoeuvre, then following a typical airport traffic pattern.

Therefore, when you level off at your MDA, turn right 45 degrees and head 259 as soon as you reach 940 or 910 MSL, whichever applies to your airspeed. When you see runway 22 out of your left window (not left front), turn left and head 214 parallel to the runway. Now you're on the downwind leg for a visual approach to runway 4.

Official guidance says pilots may fly their circle-to-land manoeuvres higher than the stated minimums as long as they are below the ceilings. It even recommends flying them at typical VFR traffic pattern altitudes if the ceiling permits. Our ceiling today is 1,500 MSL, and the airport elevation is 375 feet, so

we could fly this manoeuvre as high as 1,100 feet AGL, which is typical for a VFR pattern.

Also, official guidance says pilots should keep the runway in sight throughout a circle-to-land manoeuvre. Remember that a circle-to-land manoeuvre is a visual manoeuvre that's done after an instrument approach to the decision point. You might want to switch to the VFR version of the Mooney Bravo so you can see more of where you're going. You won't need the IFR version's ADF any more.

Normally pilots seek and receive ATC clearance for circle-to-land manoeuvres, but the ATC feature in FS2002 does not support such communications between pilot and ATC. Therefore, select 'cancel landing intentions' before beginning your circle-to-land manoeuvre. If you don't have ATC, imagine this communication.

Once you have begun your circle-to-land manoeuvre, execute a typical left-turn visual traffic pattern, complete with downwind, base and final approach legs. Then land on runway 04 normally.

Missed approach?

If we are not properly positioned to land at this airport, we must abort the landing and start over again. We must execute a missed approach if we abort prior to the circle-to-land manoeuvre or if we lose sight of the runway during the circle-to-land manoeuvre. We may execute a go-around if we abort during the visual phase (the circle-to-land manoeuvre).

The missed approach procedure for this runway is simple: climb on your 214 heading to 2,000 MSL, then contact ATC. Again, FS2002's ATC does not support these special communication needs, so our best advice is to turn left 180 degrees and head back to NW, then follow the ILS again and hope for better results.

The go-around procedure is standard: continue on 034 heading and climb to 1,000 MSL, then turn left 180 degrees and repeat the traffic pattern. Ditto on the ATC advice.

CONGRATULATIONS

You have successfully reached and approached a commercial airport on instruments, you've used flight levels, and you've landed after a circle-to-land manoeuvre. Well done, indeed!

Keep flying this tutorial to build your proficiency. Apply stronger winds and turbulence and advance to more sophisticated aircraft to make it more challenging if you like. For more information about navigation and instrument flying, read Bill Stack's Flight-Sim Navigation and Instrument Flying for Flight-Sim Pilots; www.topskills.com/fltsim.htm.

See you next time.

Bill Stack

3-Way Shootout

Two's a couple, three's a force

Suddenly everyone is coming up with Force Feedback joysticks. Is the technology ripe, or are these just nice toys for the kids? In order to find out, we got stuck into the latest hardware from ThrustMaster, Saitek and Logitech, all well known for their joysticks, with Saitek and ThrustMaster also in the HOTAS business. We installed the programming software to test ease of use, and then we tested for Force Feedback performance in FS2002, CFS2 and Rowan's Battle of Britain.

	Buttons	Hats	Wheel	SHIFT	Left hand?
Cyborg	8	1	No	Yes	Yes
Strike Force 3D	7	2	Yes	Yes	No
Fox Two Pro SHOCK	6	1	No	Yes	No

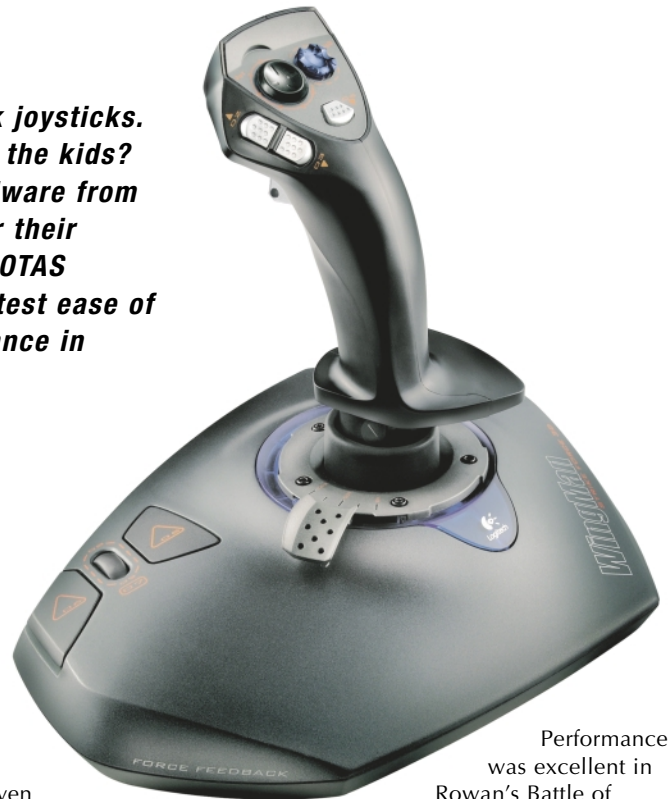
Logitech Wingman Strike Force 3D

At the top of Logitech's Force Feedback line, this one has been available for almost a year now and is an excellent product overall; this USB stick is easy to install and easy to program. When we plugged it in, having installed the software from the CD, Windows found the HID (Human Interface Device) immediately. The Wingman software is powerful, and allows adjustment of stick settings, programming, and the launching of your simulation from a single interface; clicking on a button on screen brings up a menu, and you then move directly to the keyboard to select the key stroke to program.

The Wingman is the most programmable stick in this comparison, with two eight-way hats and seven programmable buttons. The hats offer a soft 'click' when

deflected. One of the seven buttons is a wheel, just like the one on a scroll mouse, which you can click like a button or scroll forwards or backwards, giving three functions in one switch; obviously this is a natural place for trim control. You can also set one of the large base buttons to a SHIFT function, doubling the functions of all the other buttons, and effectively creating 16 button positions.

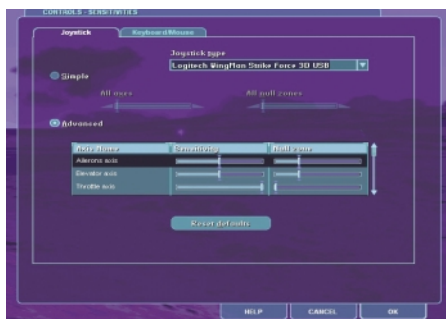
The Wingman has the best throttle lever we have seen, and in common with the other sticks we're looking at here, the twist handle provides the rudder function. The stick feels comfortable, and the handle fitted snugly into several average-sized male hands.



Performance was excellent in Rowan's Battle of

Britain and in CFS2; we could feel all the subtle forces of flight and adjust individual parameters in the setup. Unfortunately FS2002 was different altogether; the stick gave us constant overcontrol, which isn't something we want to experience when flying over the icy fjords near Skagway. We reduced the sensitivity and played with the Dead Zone settings, but nothing seemed to help.

Logitech were good enough to respond to our queries, and reported that they had found no unusual Force Feedback effects in their testing of the Wingman. They suggest that our problems might be dependent on the resolution and relatively fine sensitivity of the controller, and so it's possible that our stick had developed a slight fault. Then again, hardware driver problems in FS2002 aren't unknown, so this may well have been the culprit.



Setting up the Wingman in FS2002



No shortage of programmable options

Review Score ★★★★★

Manufacturer: Logitech

Price: £59.99

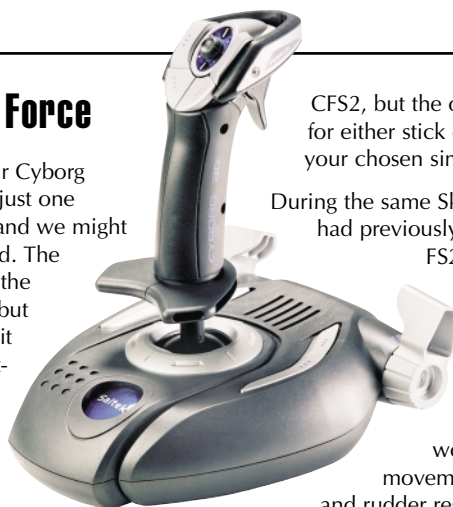
Website: www.logitech.com

At a glance: Tried, tested and a good performer, unless FS2002 is your simulator of choice

Saitek Cyborg 3D Force

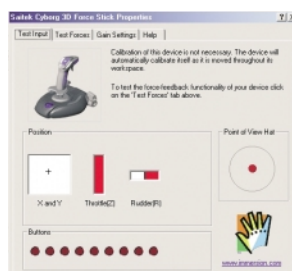
Saitek is well known for their Cyborg series, and if we could take just one standard stick to a desert island we might well choose the Cyborg Gold. The Cyborg 3D Force is roughly the same size as the Wingman, but not quite as programmable; it offers eight buttons, an eight-way POV hat, throttle and twist handle. Uniquely, the 3D Force is equally comfortable for the lefties, with a throttle that can be accessed from either side, and this is bound to be a selling point for a certain percentage of the population.

Installation was as easy as it was for the Wingman, but when we uninstalled and then attempted to reconfigure the stick the software hung up. Nevertheless the stick was still found by Windows and we went straight to the Battle of Britain, where its performance was equal to that of the Wingman – buffet and stall effects are nicely reproduced by both. Battle of Britain allows more configuration of Force settings than



CFS2, but the overall gain setting for either stick can be set outside your chosen simulation.

During the same Skagway flight we had previously attempted in FS2002 we had perfect response and there were no concerns about sensitivity; the aircraft responded as one would expect to movement along any axis, and rudder response via the twist handle was also appropriate. The stick looks more futuristic than the Wingman's



Setting the Cyborg 3D Force settings in Windows



combat style, and its feel is warmer, with the handle wrapped in a heavy black urethane.

Some users might miss having the extra hat of the Wingman Force for expanding the number of programming slots, but either is perfectly adequate as a single-stick Force Feedback solution.

Review Score

Manufacturer: Saitek

Price: £89.99

Website: www.saitek.co.uk

At a glance: Not cheap, but response is excellent and the left-handed option is to be applauded

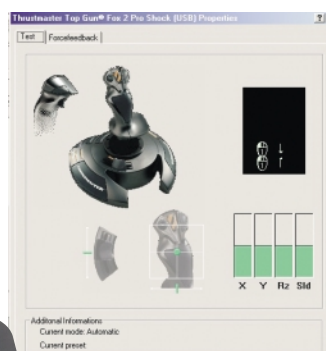
ThrustMaster Fox Two Pro Shock

This offering from the ThrustMaster stable has the looks and feel of the Afterburner joystick, although the built-in motors make it heavier and the colour scheme is black rather than aluminum. The grip handle is comfortable, and tension is adjustable via a wheel on the base of the unit.

Rather than the Afterburner's separate throttle unit, there is a throttle slider on the Fox Two, and three buttons have been added for the left hand on the base of the unit. The head of the handle sports two buttons and an eight-way hat, while rudder control is via the twist handle. With only six buttons and an eight-way hat, this is the least programmable unit of the three in this roundup.

Installation of the Fox Two Pro Shock, however, is the simplest because there is no separate power supply; the USB feed carries power to the stick. This doesn't bode well for performance, though, and the Force effects are less powerful and less well-defined than those provided by either the Logitech or the Saitek stick.

Oddly, when you first load the ThrustMapper software you can select the Gaming Profiles from a list that includes flight sims, driving sims, Quake-style games, and others, but when the interface appears on screen the long list includes only four flight sims. What is stranger still is that the

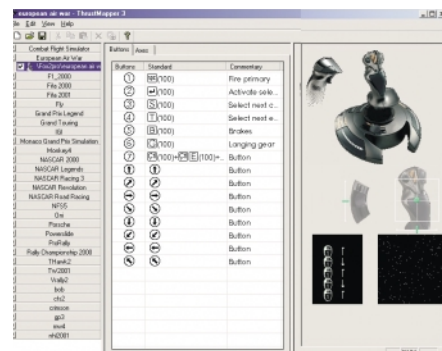


The Fox 2 USB properties

list doesn't include Ubisoft's own IL-2 Sturmovik.

Of the four configurations listed, only European Air War and Fly! are usable, since the other two configurations are designed for the Afterburner set, but loading a configuration is as simple as selecting it and then clicking on the appropriate box in the list. Programming the Fox Two Pro is easy; the button mapper interface is simple to use and includes the variables we expect to see, including SHIFT, HOLD and DELAY functions.

On our first test the stick was recognized by Windows and ThrustMapper, but when we began our second run Windows found the stick but ThrustMapper couldn't. In-flight testing was discouraging, and forces were vague and imprecise in all three of our test simulations. It was difficult to tell the difference between a gunshot and an



Fox 2 Thrustmapper – where are all the flight sims?

impact, or between engine vibration and aerodynamic forces. What was worse is that once a force was initiated in the stick, it seemed to continue. When the flight was finished and we returned to the interface, the stick continued to vibrate like some massage implement gone haywire.

To be fair, ThrustMaster don't market the device as a Force Feedback implement, but rather as a vibration device (their Force product will be the Afterburner HOTAS, which is due out soon) and so the Fox Two Pro is better suited to action gamers.

Leonard Hjalmarson

Review Score

Manufacturer: Thrustmaster

Price: £34.99

Website: www.thrustmaster.co.uk

At a glance: Unusual Force characteristics – possibly designed more with action gamers than flight simmers in mind

eDimensional E-D Glasses



Through the looking glass(es)

Well put together and quite stylish

Now that you've got your RumbleFX headphones, Interactor Vest, and Force Feedback joystick, maybe you're wondering if there exists yet another way to deepen your virtual immersion. This month's hardware treat, the E-D Glasses from eDimensional, should fit the bill. They are described as an 'Electronic Virtual Reality Viewing System', and it's claimed that they will bring holographic 3D to your PC, so we were keen to investigate why many previous Internet reviews had raved about the product. Let's get out the hair splitter and see what the hype is all about.

Stereovision explained

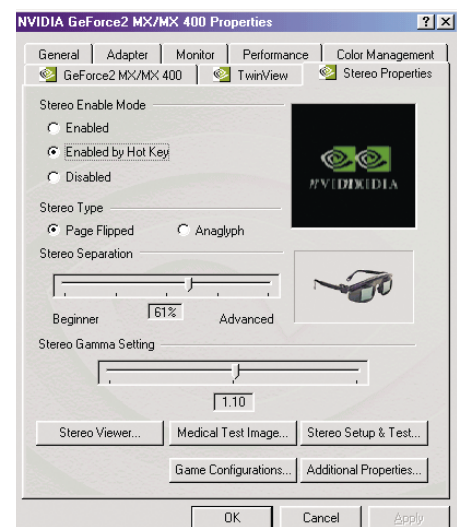
Before pulling the rabbit out of the hat, a simplified explanation of stereovision seems appropriate. Stereovision might describe how the average person sees the real world; our two eyes perceive depth by a mental interpretation of our 3D surroundings. Each eye gives a slightly different perspective on the objects viewed, and this slight difference provides depth cues to the brain. Through the use of software, drivers, and special

glasses, images on your monitor are converted into a left and a right perspective. The separate images flicker very fast, to the point where they are undetectable to the human eye. This flickering of each image is timed with flickering of the left and right lens of the glasses, again faster than can be perceived. Thus, stereovision is the producing of two separate images on screen and each eye sees one of the two images.

If this is done correctly, your mind will combine the two images in such a way that you actually have the perception of being 'in' the virtual world rather than just viewing a picture of it. In addition to perceiving depth 'into' the monitor, it's also possible to make objects appear to come 'out' of the monitor.

A sharp-looking retail box left little doubt as to what we were about to get ourselves into. Besides the wired version of the E-D glasses (yes, there is a wireless version), other components are a (strangely named) 'dongle', a power adapter for older PCs, and two CDs; one contains Wicked 3D's Eyescream program, while the other has an excellent selection of demo gaming

software. The four-page instruction manual clearly illustrates and explains hardware and driver installation, keyboard hotkeys, and basic troubleshooting procedures. A refreshing touch is an explanation of just how the glasses function.



Some tinkering required to get them running



Even Kat, our style consultant, gave them the thumbs up!

Support from the eDimensional website was absolutely first-class; questions were answered within an hour of posting, regardless of the time of day. The excellent service, we later discovered, was not simply reserved for PC Pilot. A scan of several flight sim forums revealed that nearly everyone was receiving the same kind of support. Thumbs up in this department!

Hardware installation: fast!

No hardware installation nightmares here:

- 1) Unplug your monitor's VGA cable (with the computer OFF) from the video card.
- 2) Connect the dongle device directly between the two.
- 3) Plug the glasses directly into the dongle.
- 4) Start computer.

The instruction manual says to avoid using a monitor extension cable or a splitter box, as these devices don't include the 9-pin connector which is a power source for the dongle. (We verified this by installing a splitter, and did encounter intermittent black screens in Windows.)

Software installation: not so fast!

Software installation and setup is certainly the most time-consuming part of getting the glasses to function. The Eyescream software on the driver CD is only used with graphics cards other than those produced by nVidia, which we were unaware of at the outset. Our first attempt at using the glasses was with a Voodoo 5 card, but this combination failed to work properly. System number two housed an ATI Radeon LE, but also gave us no joy. The Visiontek GeForce2 MX 200 was then called upon for duty and, thankfully, things began to click. A visit to the eDimensional website guided us to the latest stereo drivers, and also a particular set of video drivers required for full functionality. Sure enough, version 12.40 nVidia drivers coupled with the stereo drivers

(also from nVidia) unlocked the glasses. An easy to follow setup utility is then used for testing and initial configuration. It was, at last, time to go flying.

Usage in FS2002

The 3D effect can be conveniently toggled within the application using the key commands [Ctrl]-[T]; several other commands allow for more tweaking to suit the user's eyes. One very useful adjustment in FS2002 is [Ctrl]-[G] or [Alt]-[G], which raises or lowers the gamma settings, a feature we used frequently when going from daylight to night time.

The 3D experience was indeed something to behold. Looking over the instrument panel, the world below suddenly had a depth and realism several notches above the standard 3D effect we have become accustomed to. Spot Plane flying was at times even more dramatic, as the aircraft seemed to be outside the monitor, flying directly over our desktop (we actually found ourselves reaching for it, but don't tell anyone).

Perhaps the level of realism that one experiences in flight simulation can be measured by how much nervousness (fear, tension, etc.) is felt during a harrowing approach. If this is the case, the E-D glasses delivered as promised. Final approaches were an exhilarating experience, reminding us how real-life landings might feel. Descending through clouds, negotiating mountains, and touring large metropolitan areas also get honourable mentions for flight situations that are wonderfully enhanced.

Not totally trusting our own single-minded perception, several other sets of eyes were given the opportunity to experience the glasses, none of whom were flight simulation-crazed. Each tester immediately slipped away from reality for a few moments, eventually responding with words synonymous with amazing.

Pros

- Excellent 3D effects
- Simple installation
- Reasonably affordable
- Excellent sales support

Cons

- Difficulties with certain video cards
- 12.40 nVidia Detonator drivers required
- Tiring after prolonged use

Performance effects

Frame rates are certainly affected with stereovision enabled in FS2002. The performance loss is mainly noticeable if one watches the dreaded frame rate counter, otherwise only in intense scenery areas is the hit noticeable. As an example, our default Meigs scenario dropped from 25 to 18fps with stereovision enabled. That translates to a whopping 28% drop, but if we throw away the numbers and continue flying, FS2002's magical ability to deliver fluid flights at seemingly low frame rates comes shining through.

Pros and cons

The E-D glasses deliver the goods, no doubt about it. Like anything and everything, however, compromises are part of the package. While not uncomfortable, the glasses were somewhat visually restrictive unless looking straight towards the monitor. If you need to look at the keyboard, a checklist, or any printed documentation, wearing the 3D glasses becomes a bit more cumbersome. They fit well, however, over prescription glasses, although some fatigue was noticed after an hour due to their added weight.

The 3D effect is simply terrific, and the wired E-D Glasses are a reasonable purchase for the outlay. While we wouldn't shout from every hilltop that this product is a must-have for flight sim enthusiasts, we're more than happy to praise eDimensional for delivering a nifty device that does what it claims. They really would make a great gift for anyone who enjoys pushing the virtual reality envelope. ■

Greg Gott

Review Score



Manufacturer: eDimensional

Price: £70.00 (wired), £100.00 (wireless) from RC Simulations, or \$69.95 (wired), \$99.95 (wireless) from the eDimensional US website.

Websites: www.edimensional.com
www.rcsimulations.com

At a glance: Video card issues aside, a very worthwhile buy, with excellent performance and good support from the manufacturers.

GoFlight Control Modules

Does that switch really make the coffee?

Last year we took a look at the superb GoFlight GF-45 avionics unit, a useful alternative to using your mouse and keyboard to set the various NAV and COM frequencies on your flight simulator. At the time our only real criticism was that, if you stacked three or four of them together (as the designers intended), they became rather unstable. It seems that the designers agreed with us, because they've recently added a number of new modules to the range. These include a handy rack console that holds the whole lot together, much like the instrument stack you'll find in many real aircraft, and most of the new modules are user-programmable, consequently making the original GF-45 display units much more versatile.

The rack console consists of a sturdily built frame made from black-coated metal, incorporating a polished steel bar at each side with a row of evenly spaced, pre-threaded holes. These are designed to accommodate a combination of different modules, so you can decide on the layout

that suits you best. It also allows you to start with just one or two modules and then add more as the need (or more likely the state of your finances) dictates. Once the modules are in place the whole thing is quite sturdy; the quality of the switches is good, and even the firm hand needed to operate them won't disturb the rack at all.

If you fill the rack, you'll probably run out of USB ports unless you have one of the new motherboards, such as the MSI K7T266 Pro, that have five USB ports available. This isn't really a major issue, because you can get an extra internal or external USB hub for a reasonable price. If you need one, GoFlight suggest that you get a self-powered unit, which we did for our review, to avoid overloading the USB bus on your PC.

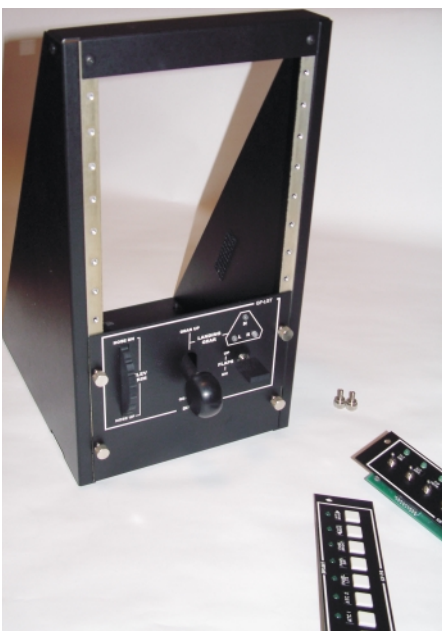
The GF-T8 module is essentially a row of switches, with labels and operational LEDs



The parts all come individually packed

above, which can be programmed for any one of a hundred different functions. In common with the other modules it comes mounted on a steel back-plate which mates with the pre-threaded holes in the rack. It also features a row of recessed rectangles designed to accept the new magnetic printable sheets from Avery (although we couldn't find a UK supplier for these yet). Nevertheless GoFlight provide a set of typical labels with each unit, as well as a Word document containing over a hundred pre-drawn labels for you to print out yourself.

The GF-P8 module is very similar to the T8, except that it consists of a row of buttons rather than switches. Once again these are



Arrange the units to suit the aircraft you fly



Straightforward assembly - take note IKEA



Fully loaded and ready for action



Greater realism, and much easier than a keyboard/mouse setup

fully programmable and come complete with a set of labels, USB cable and mounting screws.

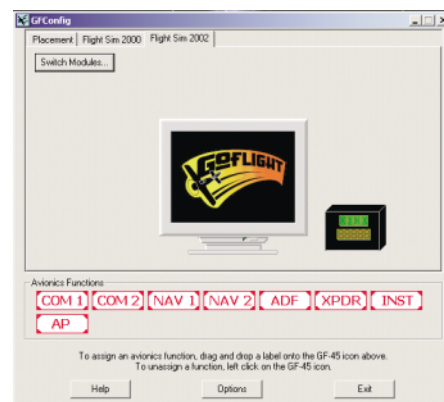
Completing the set is another new module called the GF-LGT, which functions as a flap lever, landing gear and trim control module. These controls are modelled to look like typical cockpit equipment, and are supplied with three multi-coloured LEDs to indicate the current undercarriage status: three greens for down and locked, three reds for up, and off when fully retracted.

There's also a new GF-45 display module available to suit the rack, although existing GF-45 owners can simply buy a conversion plate to allow their existing units to fit into the new console. We had a go at converting one of our original units to see how easy this actually was and, to be fair, it's simply a matter of removing a few screws with the

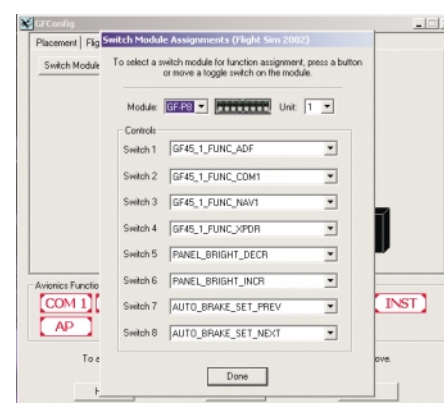
Allen key supplied, and then swapping the front plate for the new one...as easy as that!

Once all the hardware has been installed, it only remains to run the new configuration software in order to assign your preferred keystrokes to the switches and buttons on the GoFlight units; this automatically updates all the aircraft in your FS directory when you exit the program. The great thing about this setup is that you can manage with a single GF-45 by allocating the different NAV, COM, Transponder and ADF functions to the T8 or P8 modules. Switching between them is then simply a matter of pushing a button or throwing a switch. Very similar, in fact, to the way a multifunction radio works in a real cockpit.

Actually flying with the GoFlight instruments is excellent, because you don't have to fiddle with the mouse or keyboard and fly at the same time. If you combine them with a decent yoke and set of rudder pedals, their looks and operation are almost as good as any you'll find in a professional simulator. The system works completely transparently for most of the functions you're going to need, although some of the more obscure controls found on third-party aircraft panels cannot be assigned at present. We



The primary configuration program allocates the GF-45 functions



Set the switch modules from these dropdown boxes

understand from GoFlight that an SDK (Software Development Kit) will be available shortly for those who want to duplicate every conceivable function.

These units aren't cheap, but the quality stands out, and a setup like the one we've reviewed would set you back around £420.00. When you compare this with instrumentation from companies offering similar functions, however, you'll find that they compare very favourably. ■

Joe Lavery



Don't touch that – it might be live!



Use a hub if your PC can't support all the USB devices

Review Score ★★★★★

Manufacturer: GoFlight

Price: Rack £89.99

GF-45PM £79.95

GF-P8 (Panel buttons) £79.99

GF-T8 (Panel toggles) £89.99

GF-AC Module bay cover £9.99

GF-AC Cable organiser kit £14.95

GF-45 Panel mount conversion kit £12.99

Website: www.goflightinc.com

At a glance: Turn simulated flying into a whole new experience when you use a professional rig like this, but be prepared to do some explaining to the financial controller!

System Requirements: : PIII 800MHz, 128Mb RAM, 14Mb disk space, USB ports

Recommended: P4 or AthlonXP 1000MHz, 133MHz Bus, 256Mb RAM, 32Mb 3D graphics card, USB hub

Test Pilot

"...given the chance, I would do it all over again."



Valiant to Valiant refuelling, 1957. Author is flying the receiver

Brian Trubshaw sadly died earlier this year, but his place in the history of aviation is assured as the man at the controls of Concorde during its first test flight in 1969. Much of *Test Pilot* deals with the development of the world's first supersonic passenger aircraft and the many complications involved in this unprecedented Anglo-French project. "It's a miracle that the project actually happened," the author writes at one point. The truth of this comment becomes all too apparent on reading how development tasks were split between Filton and Toulouse, and how only the inclusion of a 'no break' clause in the agreement between the British and French governments prevented the British side of the partnership cancelling the project in 1964 on the grounds of cost.

The development and certification of Concorde is fascinating not only in terms of flight testing, but also because of the political upheavals of the era and the phenomenal public interest in the project (not all of it favourable), and all aspects of the story are worth investigating. From the concept stage through to certification, eventual route proving and crew training, Brian Trubshaw provides all the background information behind the genesis of a legendary and beautiful aircraft. His conclusion, sadly, is that only the United States will ever have the financial resources to commit to the development of a second-generation supersonic transport.

There's no shortage of in-flight testing reports in *Test Pilot* - some amusing, some terrifying, and some unbelievable - and they are all described in the calm and measured manner you might expect from a man whose test flying career spanned 35 years. Aerial misfortunes are present throughout - fires, broken ailerons, slipping bombs,

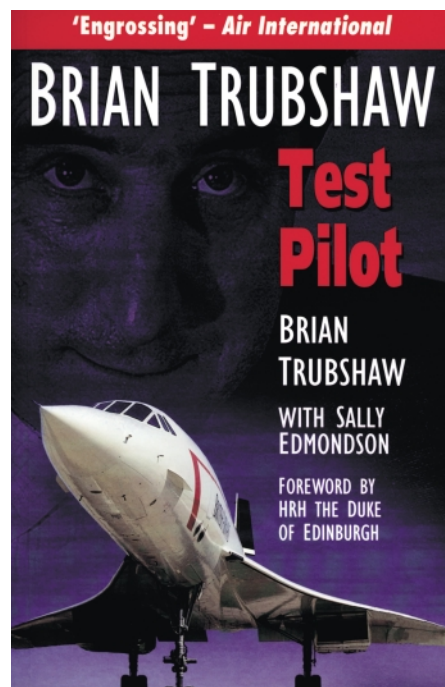


First flight of Concorde 002, April 1969

emergency landings, and landing gear failure, to name a few - and the author's accounts of early flights in Concorde are particularly memorable.

Test Pilot isn't just about Concorde, however, and the author's earlier exploits shouldn't be underestimated. His love of flying is evident as he recounts his early days in the Air Section of his school's OTC during WWII, his RAF years, and travels in Vickers Vikings with the King's Flight. His career as a test pilot soon led him to Vickers Armstrongs where he was heavily involved in the first flights of the world-beating Viscount, testing of the Valiant nuclear bomber, and development of in-flight refuelling for the Valiant.

Before his involvement with the Concorde project he also overcame the problems associated with putting a new type of engine in a brand new airframe for the Vanguard, and clearly developed a deep affection for the VC10, described as "a great aeroplane that managed to survive more trials and tribulations than it deserved". He also flew tests in the BAC 1-11, a plane designed to bring the comfort and speeds of a jet to routes served by propeller-driven



aircraft, but one that was ultimately dogged by misfortune.

"In our line of activity you need a bit of luck," says the author with characteristic modesty, but he also proves that you need enormous courage, exceptional ability, and a huge degree of technical awareness in order to spend over three decades at the highest level of test flying. *Test Pilot* admirably combines one man's personal story with enough technical and historical information to make it a worthwhile read, both for those interested in flying and flight modelling, and for anyone wishing to gain an insight into this particularly eventful era in the British aviation industry.

Joe M. Besser

Review Score ★★★★★

Publisher: Sutton Publishing

Author: Brian Trubshaw with Sally Edmondson

Price: £9.99 paperback (£19.99 hardback)

Website: www.suttonpublishing.co.uk

At a glance: A revealing look at an amazing career - flight testing and aviation history brought seamlessly together.

Win a brilliant Corgi collection

in our great Century of War competition



CORGI
Just Flight

Anyone with an interest in flight simulation, by definition, is interested in aircraft, and it's a fair bet that time has been spent in the past with glue and scalpel building model aircraft. However, we don't always have the time these days to carefully paint and construct a detailed model of our favourite planes, which is where Corgi comes in. They've always been famous for their die-cast model cars, but in recent years they've widened their range to include famous aircraft and period vehicles. The quality of these models

is second to none, and many of them are available in themed series. Their Century of War gift packs include a set called King and Country, which depicts aircraft and vehicles from the Battle of Ypres in 1917. There's a Sopwith Camel, Fokker triplane, an 'Old Bill' bus and a Mk IV tank. From a slightly later era comes Their Finest Hour and this one consists of a Spitfire, Me109, an AEC tractor and a Morris van. The vehicles are mounted onto a clear crystal plinth, while aviation models come with unique attachments to secure them to the plinth.

The Century of War gift packs are available from all good gift stores. For stockists call 0845 603 9070, or for more information on the Corgi ranges visit www.corgiclassics.com

We've got five of the excellent WWI sets and five Battle of Britain sets to give away, and each lucky winner will also receive a copy of Combat Aces or Battle of Britain Memorial Flight from Just Flight. Of course, these two excellent collections are more famous for their aircraft models than their model aircraft!

HOW TO ENTER

All you have to do to win one of these superb prizes is correctly answer the following questions:

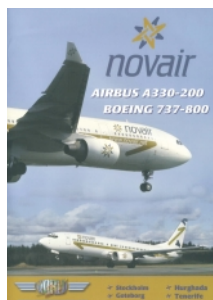
- | | | |
|--|------------------------------------|--|
| 1) Who commanded the British forces during the third Battle for Ypres (Passchendaele) in 1917? | 2) Where is Biggin Hill Aerodrome? | 3) Who was the highest scoring British ace of WW1? |
| a) General Sir Douglas Haig | a) Yorkshire | a) Major Edward 'Mick' Mannock |
| b) General Sir John French | b) Essex | b) Captain Albert Ball |
| c) General John J. Pershing | c) Kent | c) Major James McCudden |

The competition is open to PC Pilot readers from anywhere in the world with the exception of PC Pilot staff (and their gamekeepers). You can send your answers by e-mail to comps@pcpilot.net or on a postcard/back of an envelope to:

Corgi Competition, PC Pilot, PO Box 11, St. Ives, PE27 3GW, United Kingdom

Please make sure that you clearly state your full name, address and e-mail address (if you have one). The competition closes on 31st March 2002. Entries received after that date cannot be included and prizes will be drawn at random from correct answers.

Air Contractors & Novair World Air Routes DVDs



Cargo or commuters

Just Planes' aviation videos and DVDs come highly recommended, so we thought we'd take a look at a couple of recent releases from their World Air Routes series. The series covers 66 airlines from around the globe and a huge range of aircraft covering nearly 300 destinations across 74 countries.

If you have a special interest in a certain plane, or a particular region or airport, you can probably find it on the Just Planes website. Naturally the heavy Boeings and Airbuses feature heavily, but less common planes are also well represented, whether it's Gabon Express's Caravelle, Russian airliners, or the Grumman Mallard seaplane operated by Chalk's Ocean Airways in Florida. If you've ever wondered about the airports in the Polynesian islands or Iceland, flying with Air Tahiti and Islandsflug should satisfy your curiosity.

Dublin-based Air Contractors have been operating a fleet of Airbus A300s, Boeing 727s, and Lockheed Hercules on scheduled and charter cargo flights in Europe for 30 years now, and the Air Contractors DVD takes us along for the ride. Cargo operators may not have the perceived glamour status of airline pilots, but they certainly work as hard. External checks and instrument explanations provide a contrast to the gritty business of getting palettes loaded and transported, and the mighty Hercules gets its well-deserved spot in the limelight. "If it fits, we can take it," says the loadmaster, giving the impression that he's probably got a few stories to tell about his cargos. Many of the short European hops here (to nine destinations in five countries) are during the night – essential but antisocial work!

It's passengers rather than packages for Novair, in their shiny new fleet of Airbus 330s and Boeing 737-800s; they fly from



airports around Scandinavia to charter destinations around the Mediterranean and the Canary Islands, as well as making long-haul trips to destinations such as Thailand and India. The DVD takes us on four of their shorter flights, and external views of the terrain and passing aircraft provide a break from the more technical presentations of the FMC, PFD, pre-flight paperwork and so on. Variations in sound quality occasionally have you reaching for the remote control, but windswept airports and noisy cabins must be a sound recordist's nightmare.

Just Planes (not to be confused with Just Flight!) also offer a series of Flight in Cockpit videos, as well as a selection of videos dedicated to the traffic at one particular airport. The former might be a better buy than the ones we've looked at for the enthusiast wanting more focus on the purely technical side of an aircraft's operation, but there are many of us who are quite glad of a little light relief in the form of external views, especially over the course of three hours viewing.



The majority of Just Planes' products is currently on video (PAL and NTSC) but, DVDs are growing in popularity, and these ones are coded for all regions. Their range of products aside, the gorgeous photo gallery, links to airlines and airports, and comprehensive flight information pages should give everyone plenty of good reasons to bookmark their website.

Joe M. Besser

Review Score

Publisher: Just Planes

Price: £24.00 approx. (Air Contractors, 180 mins.) £17.00 approx. (Novair, 109 mins.)
A list of retailers is included on the website.

Website: www.justplanes.com & www.worldairroutes.com

At a glance: Entertaining and informative without a technical overload.

Hunters In The Sky

"The heavens were the grandstands..."

"You've got to have the right attitude; you've got to have the right training; you've got to be aggressive; you've got to be professional in every sense of the word... We're there to win, we're there to destroy."

Francis Gabreski, USAAF

With a running time of over five hours, this four video collection is an impressive series on the fighter aces of WWII, the aircraft they flew, and the developments that influenced the outcome of years of aerial combat in the various theatres of the war. Extensive combat footage, much of it filmed at incredibly close quarters, superbly illustrates commentary from surviving pilots of all nationalities, while the narration provides the relevant historical background.

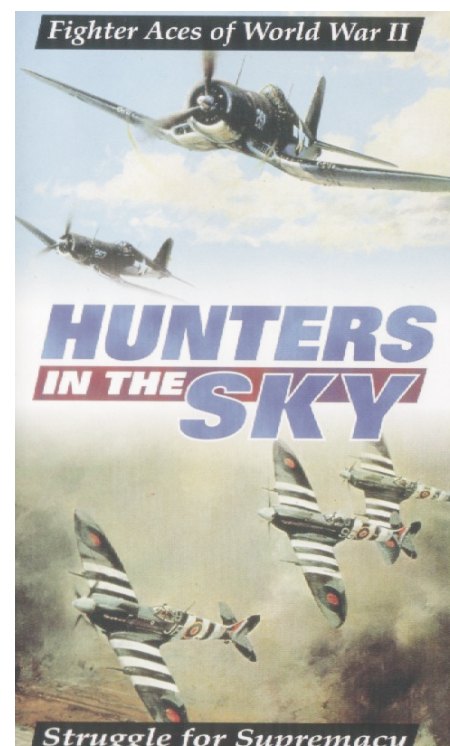
The first two videos, *Knights of the Sky*, focus on the Battle of Britain, the air defence of Russia, and the war in the Pacific. They also include chapters devoted to the American Volunteer Group (the Flying Tigers), bomber escorts, and the Internationals who felt compelled to fight alongside the RAF. Recurring topics throughout are the qualities required to remain a successful fighter pilot, from having ultimate confidence in their own abilities and the understanding and overcoming of fear, to tactical awareness and the need to exploit the weaknesses of the enemy and the strengths of their own aircraft. German pilots such as the legendary Adolf Galland (104 kills) talk of the tactical naivety of the Luftwaffe and amateurish



leadership; the Russians speak of their overwhelming resolve to defend their country against all odds, and RAF aces discuss the factors that contributed to their victory against far superior numbers.

Only a small number of fighter pilots, most of whom had a bare minimum of training, chalked up a considerable number of kills, and it's undoubtedly their testimonies that make this series indispensable; these were all men who had to rely on their flying skills to avoid a sudden and solitary death, and they all provide poignant recollections on their love of flying, mortality, camaraderie, tactics and combat situations. Many of their accounts of combat are chilling, as are the tales of some of their leaders' ignorance of their heroic efforts – who would ever believe that Luftwaffe pilots, under relentless pressure to fly countless missions until they were finally downed (1,000 sorties was not uncommon), could ever be accused of cowardice?

Struggle for Supremacy, the second part of the package, concentrates on the development of aerial combat as the war progressed, leading ultimately to the collapse of the Reich and victory in the Pacific. The pilots elaborate on the design and development of the opposing aircraft, their respective performance and firepower, the huge importance of effective radar, and the tactics they had to adopt to survive and win. The manoeuvrability of the Zero is contrasted with the superior firepower of the Wildcat and Corsair, decisive battles



are analysed, and we learn how the threat of the Me262, the world's first jet fighter, was neutralised.

Ultimately this is a story which hinges on tactical and technological superiority in the air, and the war in the factories and design laboratories was clearly no less crucial than the fighting in the skies. Many of the subjects here have been studied individually in greater depth, but as an overview of aerial warfare throughout WWII and a testament to the exceptional courage of the pilots involved, this is an outstanding and affordable package which will stand up to repeated viewing. We obtained our copy from Duke Video, better known for their motorsport videos, but their range now includes many good aviation titles. Call them on 01624 640000 for a catalogue, or see www.dukevideo.com

Richard Parnell

Review Score

Publisher: DD Video

Price: £29.99

Website: www.ddvideo.co.uk

At a glance: A complete history of the fighter air war in WWII. Outstanding archive footage, and fascinating first-hand accounts.



Downloads

Star performers from the Internet

Whatever your thoughts about FS2002, one thing's certain: the designers amongst you haven't been slow in coming up with some very fine aircraft (and scenery!) to embellish Microsoft's new release. We never fail to be amazed at the creativity and level of detail that we come across on a daily basis. Our grateful thanks are due to all the authors who have allowed us to share these files with you on our cover CD – this should make things easier for those of you who are building ever expanding virtual hangars to house these beauties. Appreciate their authors' talents, and then enjoy flying them!

Contrary to what the list of files shows, we do try to include all spheres of flight simulation but it seems that once again FS2002 files dominate the major download sites. For those of you that are still using FS98 or FS2000 and have downloaded files that you would like to share with the rest of the FS community, drop us an e-mail with your recommendations.

Joe Lavery



C-17 Globemaster III Jet Aircraft



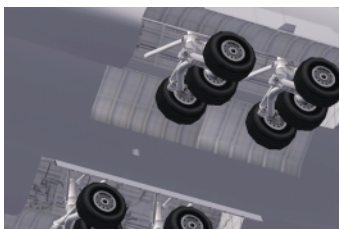
Flight Simulator 2002 (Please note that this aircraft is only for FS2002 Pro)

Name: C-17	Download from: Cover CD
Name: C-17 Sound Files	Download from: Cover CD
Name: C-17 Panel	Download from: Cover CD
Author: Project Open Sky	Filename: POSkyC17.zip
Author: Aaron R. Swindle	Filename: POSC17sz.zip
Author: Paul Schwerdtfeger	Filename: c17pan02.zip

The Globemaster III looks like it means business



Notice the HUD in the centre of the screen



She needs a decent set of shoes to hold that weight



She drags her big frame into the air



Nice clean lines...and no sign of the jaggies



A very stable lady



Alternate gauge selected

The Star Download for this issue is from the prolific Project Open Sky, in the shape of their Boeing C-17 Globemaster III aircraft. It comes with an appropriate sound package from Aaron R. Swindle, containing original engine sounds and actual interior sounds recorded from a real C-17 in flight. To complete the package we recommend the new FS2002 C-17 Globemaster III panel from Paul Schwerdtfeger. All necessary files are on the CD and can be accessed from the download menu page.

Project Open Sky is an association of flight simulator enthusiasts, currently consisting of 20 members, although there are many other associates. The C-17 aircraft presented here is the individual work of:

Model Designers: Owen Hewitt, with the assistance of Gary Carlson, Jim Goldman & Hiroshi Igami

Animation: Mitsushi Yutaka

Flight Dynamics Designer: Steve Small, FSD

Paint: Owen Hewitt, C. Vincent Cho

Test Pilot/ FDE Advisor: Andrew Cozens, Boeing Long Beach

Open Sky is a global co-operative initiative, meaning that they will allow any individual or virtual airline to use and repaint their aircraft. No permission is ever granted to the commercial market. They want everyone to enjoy their freeware aircraft models, all of which incorporate the latest in visual and dynamic development techniques.

As you can see, the C-17 is made to a very high standard, with a variable 32-sided fuselage (a POSKY original technique), a maximum of detailed moving parts, night lighting and FS2002-style lights; more importantly, it flies beautifully - Steve Small has got the dynamics just right. It lumbers along as you would expect, yet handles well; as long as you're ahead of the game, she'll do exactly what you ask of her.

The corresponding panel from Paul Schwerdtfeger is optimised for 1024x768 resolution, and you'll notice that it has a transparent HUD facility, switching Rose and ARC mode HSI gauge, and four fully functional MFD displays. The background bitmap is well drawn, featuring a centre pedestal with throttles, radios, and FS2002 night lighting. All this, combined with authentic sounds from Aaron Swindle, comes together to make a very impressive freeware product.

The rest of the best



AIMap Utility

**Flight Simulator
2000/2002**

Author: Rodolfo Arata
Download from: Cover CD
Filename: aimap.zip



Alouette III Helicopter

**Flight Simulator
2000/2002**

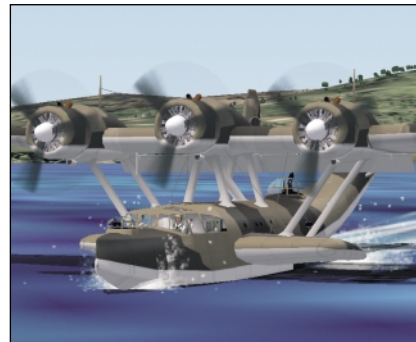
Author: Wolfgang Kulhanek
Download from: Cover CD
Filename: alouette3airglacier1Fs2002.zip



BOAC 747 Jet Aircraft

**Flight Simulator
2002**

Author: Project Opensky
Download from: Cover CD
Filename: os_boac.zip



Do-24T Seaplane Prop Aircraft

**Flight Simulator
2002**

Author: Mathias Pommerien
Download from: Cover CD
Filename: do24t2k2.zip



Euroflight Fokker 100 Jet Aircraft

**Flight Simulator
2002**

Author: Euroflight Group
Download from: Cover CD
Filename: efgf100ae.zip



Air Nippon 737-200 Jet Aircraft

**Flight Simulator
2002**

Author: Terry Gaff
Download from: Cover CD
Filename: b732-ank.zip



Sockeye Lake Scenery

**Flight Simulator
2002**

Author: Tom Fica
Download from: Cover CD
Filename: sockeye.zip



Fedex Airbus 310 Jet Aircraft

X-Plane

Author: Roger Wielgus
Download from: Cover CD
Filename: Fedex310.zip



Piper Tomahawk Prop Aircraft

**Flight Simulator
2000/2002**

Author: Carenado
Download from: Cover CD
Filename: PaTomyFull.zip



BAe 146-300 Jet Aircraft

**Flight Simulator
2002**

Author: Jon Murchison
Download from: Cover CD
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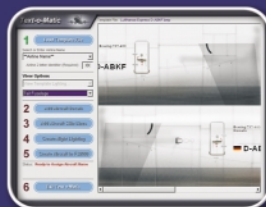
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